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NIOSH

POCKET GUIDE TO
**CHEMICAL
HAZARDS**



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

CDC
CENTERS FOR DISEASE CONTROL

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
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National Institute for Occupational Safety and Health**

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PREFACE

The *Pocket Guide to Chemical Hazards* presents information taken from the *NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards*, from National Institute for Occupational Safety and Health (NIOSH) criteria documents and Current Intelligence Bulletins, and from recognized references in the fields of industrial hygiene, occupational medicine, toxicology, and analytical chemistry. The information is presented in tabular form to provide a quick, convenient source of information on general industrial hygiene and medical monitoring practices. The information in the *Pocket Guide* includes chemical structures or formulas, identification codes, synonyms, exposure limits, chemical and physical properties, incompatibilities and reactivities, measurement methods, respirator selections, signs and symptoms of exposure, and procedures for emergency treatment.

The information assembled in the original 1978 printing of the *Pocket Guide* was the result of the Standards Completion Program, a joint effort by NIOSH and the Department of Labor to develop supplemental requirements for the approximately 380 workplace environmental exposure standards adopted by the Occupational Safety and Health Administration (OSHA) in 1971.

This revision of the *Pocket Guide* includes current exposure limits, updated sampling and analytical methods, new respirator selections for chemicals with revised exposure limits, flammability/combustibility ratings, and specific gravities.

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Also, thanks are due to those individuals who reviewed and constructively commented on the *Pocket Guide* during its development and subsequent revisions.

I. INTRODUCTION

The *NIOSH Pocket Guide to Chemical Hazards* is intended as a source of general industrial hygiene information for workers, employers, and occupational health professionals. The *Pocket Guide* does not contain an analysis of all pertinent data; rather, it presents key information and data in abbreviated tabular form for 398 chemicals or substance groupings (e.g., cyanides, fluorides, manganese compounds, etc.) that are found in the work environment and that have existing Occupational Safety and Health Administration (OSHA) regulations. The industrial hygiene information found in the *Pocket Guide* should help users recognize and control occupational chemical hazards. The chemicals contained in this revision are substances previously listed in the OSHA Z-1, Z-2, and Z-3 Tables (many of which now have revised permissible exposure limits [PELs]). Additional substances that were included as part of the new OSHA Z-1-A Table on January 19, 1989, will be incorporated into the next edition of the *Pocket Guide*.

Background

In 1974, the National Institute for Occupational Safety and Health (NIOSH) (which is responsible for recommending health

and safety standards) joined OSHA (whose jurisdictions include promulgation and enforcement activities) in developing a series of complete occupational health standards for substances with existing PELs. This joint effort was labeled the Standards Completion Program and involved the cooperative efforts of several contractors and personnel from various divisions within NIOSH and OSHA. The Standards Completion Program developed 380 substance-specific draft standards with supporting documentation that contained technical information and recommendations needed for the promulgation of new occupational health regulations. The *Pocket Guide* was developed to make the technical information in those draft standards more conveniently available to workers, employers, and occupational health professionals. The *Pocket Guide* is updated periodically to reflect new data regarding the toxicity of various substances and any changes in exposure standards or recommendations.

Data Collection and Application

The data collected for this revision were derived from a variety of sources, including NIOSH criteria documents and Current Intelligence Bulletins (CIBs), and recognized references in the fields of industrial hygiene, occupational medicine, toxicology, and analytical chemistry.

II. NIOSH RECOMMENDATIONS

Acting under the authority of the Occupational Safety and Health Act of 1970 (Public Law 91-596), NIOSH develops and periodically revises recommended exposure limits (RELs) for hazardous substances or conditions in the workplace. NIOSH also recommends appropriate preventive measures to reduce or eliminate the adverse health and safety effects of these hazards. To formulate these recommendations, NIOSH evaluates all known and available medical, biological, engineering, chemical, trade, and other information relevant to the hazard. These recommendations are then published and transmitted to OSHA and the Mine Safety and Health Administration (MSHA) for use in promulgating legal standards.

NIOSH recommendations are published in a variety of documents. Criteria documents recommend workplace exposure limits and appropriate preventive measures to reduce or eliminate adverse health effects and accidental injuries.

CIBs are issued to disseminate new scientific information about occupational hazards. A CIB may draw attention to a for-

merly unrecognized hazard, report new data on a known hazard, or present information on hazard control.

Special Hazard Reviews, Occupational Hazard Assessments, and Technical Guidelines support and complement the other standards development activities of the Institute. Their purpose is to assess the safety and health problems associated with a given agent or hazard (e.g., the potential for injury or for carcinogenic, mutagenic, or teratogenic effects) and to recommend appropriate control and surveillance methods. Although these documents are not intended to supplant the more comprehensive criteria documents, they are prepared to assist OSHA and MSHA in the formulation of regulations.

In addition to these publications, NIOSH periodically presents testimony before various Congressional committees and at OSHA and MSHA rulemaking hearings.

A complete list of occupational safety and health issues for which NIOSH has formal policies (e.g., recommendations for occupational exposure to chemical and physical hazards, engineering controls, work practices, safety considerations, etc.) is scheduled for publication in 1990.

III. HOW TO USE THIS POCKET GUIDE

The *Pocket Guide* has been designed to provide chemical-specific data to supplement general industrial hygiene knowledge. To maximize the amount of data provided in this limited space, abbreviations and codes have been used extensively. These abbreviations and codes, which have been designed to permit rapid comprehension by the regular user, are discussed for each column in the following subsections.

Chemical Name and Structure/Formula, CAS and RTECS Numbers, and DOT ID and Guide Numbers

Chemical Name and Structure/Formula. — The chemical name found in the OSHA General Industry Air Contaminants Standard (29 CFR* 1910.1000) is listed first. The chemical structure or formula is also provided; carbon-carbon double bonds (-C=C-) have been indicated where applicable. A page index for selected synonyms and trade names is included at the back of the *Pocket Guide* to help the user locate a specific substance.

CAS and RTECS Numbers. — Below the chemical structure/formula is the Chemical Abstracts Service (CAS) registry

number. This number, in the format xxx-xx-x, is unique for each chemical and allows efficient searching on computerized data bases. A page index for all CAS registry numbers listed is included at the back of the *Pocket Guide* to help the user locate a specific substance.

Immediately below the CAS number is the *NIOSH Registry of Toxic Effects of Chemical Substances* (RTECS) number, in the format ABxxxxxxx. RTECS may be useful for obtaining additional toxicologic information on a specific substance.

DOT ID and Guide Number. — Under the RTECS number are the U.S. Department of Transportation (DOT) identification number and the corresponding guide number. Their format is xxxx xx. The identification number (xxxx) indicates that the chemical is regulated by DOT. The Guide number (xx) refers to actions to be taken to stabilize an emergency situation; this information can be found in the DOT 1987 *Emergency Response Guidebook*, DOT P 5800.4 (Office of Hazardous Materials Transportation [DHM-51], Research and Special Programs Administration, U.S. Department of Transportation, 400 Seventh Street S.W., Washington, D.C. 20590).

Synonyms, Trade Names, and Conversion Factors

Common synonyms and trade names are listed alphabetically for each chemical. Factors for the conversion of ppm

*Code of Federal Regulations.

(parts per million parts of air) to mg/m^3 (milligrams per cubic meter of air) at 68°F and 1 atmosphere are listed for all liquids and gases.

Exposure Limits

The NIOSH RELs are listed first in this column. Unless noted otherwise, RELs are time-weighted average (TWA) concentrations for up to a 10-hour workday during a 40-hour workweek. A short-term exposure limit (STEL) is designated by "ST" preceding the value; unless noted otherwise, the STEL is a 15-minute TWA exposure that should not be exceeded at any time during a workday. A ceiling REL is designated by "C" preceding the value; unless noted otherwise, the ceiling value should not be exceeded at any time. Any substance that NIOSH considers to be an occupational carcinogen is designated by the notation "Ca" (see Appendix A, which contains a brief discussion of occupational carcinogens).

The OSHA permissible exposure limits (PELs), as found in Tables Z-1-A or Z-2 of the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000), are listed next. Unless noted otherwise, PELs are TWA concentrations that must not be exceeded during any 8-hour work shift of a 40-hour workweek. A STEL is designated by "ST" preceding the value and is measured over a 15-minute period unless noted otherwise.

OSHA ceiling concentrations (designated by "C" preceding the value) must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15-minute TWA exposure. In addition, beryllium, ethylene dibromide, and methylene chloride (from Table Z-2) have PEL ceiling values that must not be exceeded except for a maximum peak over a specified period. Appendix B contains a brief discussion of carcinogens regulated by OSHA.

The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) are also listed when they are more restrictive than the OSHA PEL or NIOSH REL. Unless noted otherwise, TLVs are 8-hour TWA concentrations. Ceiling concentrations (which should not be exceeded at any time) are designated by "C". A STEL is designated by "ST" and is measured over a 15-minute period. Where applicable, the ACGIH A1 (confirmed human carcinogen) and A2 (suspected human carcinogen) designations for individual chemicals are included. The ACGIH TLVs for 1989-1990 were used for this printing of the *Pocket Guide*.

Concentrations are given in ppm, mg/m^3 , or fibers per cubic centimeter ($\text{fibers}/\text{cm}^3$). The "[skin]" designation indicates the potential for dermal absorption; skin exposure should be prevented as necessary through the use of good work practices and gloves, coveralls, goggles, and other appropriate equipment. Appendix C contains more detailed discussions of

the specific exposure limits for asbestos, the various chromium compounds, coal tar pitch volatiles, and cotton dust. Appendix D contains a brief discussion of substances with no established RELs.

IDLH

Immediately dangerous to life or health concentrations (IDLHs) represent the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing (e.g., severe eye irritation) or irreversible health effects. These values were determined during the Standards Completion Program only for the purpose of respirator selection. The notation "Ca" appears in this column for all substances that NIOSH considers to be potential human carcinogens (NIOSH recommends the most protective respirators for exposure to these substances). However, the IDLHs that were originally determined in the Standards Completion Program are shown in brackets following the "Ca" designation (note: carcinogenic effects were not considered in the Standards Completion Program). "Unknown" indicates that because of a lack of data, no IDLH could be determined. "LEL" indicates that the IDLH is based on the lower explosive limit. "N.E." indicates that no evidence could be found for the existence of an IDLH.

Physical Description

This column provides a brief description of the appearance and odor of each substance. Notations are made as to whether a substance can be shipped as a liquefied compressed gas or whether it has major use as a pesticide.

Chemical and Physical Properties

The following abbreviations are used for the chemical and physical properties given for each substance. "NA" indicates that a property is not applicable, and a question mark (?) indicates that it is unknown.

MW	.....	Molecular weight
BP	.....	Boiling point at 1 atmosphere, °F
Sol	.....	Solubility in water at 68°F*, % by weight (i.e., g/100 ml)
Fl.P	.....	Flash point, closed cup (unless annotated "(oc)" for open cup), °F
IP**	.....	Ionization potential, eV (electron volts)
VP	.....	Vapor pressure at 68°F*, mm Hg; "approx" indicates approximately
MLT	.....	Melting point for solids, °F
FRZ	.....	Freezing point for liquids and gases, °F
UEL	.....	Upper explosive limit in air, % by volume (at room temperature*)

See footnotes at end of table.

LEL	Lower explosive limit in air, % by volume (at room temperature*)
Sp.Gr	Specific gravity at 68°F* referenced to water at 39.2°F(4°C)

*If noted after a specific entry, these properties may be reported at other temperatures.

**Ionization potentials are given as a guideline for the selection of photoionization detector lamps used in direct-reading instruments.

When possible, the flammability of a substance was determined and listed below the specific gravity. The following OSHA criteria (29 CFR 1910.106) were used to classify flammable or combustible liquids:

Class IA flammable liquid	Fl.P below 73°F and BP below 100°F.
Class IB flammable liquid	Fl.P below 73°F and BP at or above 100°F.
Class IC flammable liquid	Fl.P at or above 73°F and below 100°F.
Class II combustible liquid	Fl.P at or above 100°F and below 140°F.
Class IIIA combustible liquid	Fl.P at or above 140°F and below 200°F.
Class IIIB combustible liquid	Fl.P at or above 200°F.

Incompatibilities and Reactivities

This column lists important hazardous incompatibilities or reactivities of each substance.

Measurement Method

This column provides a brief, key word description of the suggested sampling and analysis method. Each description comprises four components:

(1) collection method, (2) sample work-up, (3) analytical method, and (4) method number. The method number is from the 2nd or 3rd edition (i.e., II or III) of the *NIOSH Manual of Analytical Methods* (DHHS [NIOSH] Publication No. 84-100). If the 2nd edition is cited, this fact is noted along with the appropriate volume number [e.g., II(4)]. In a number of instances, the table cites the *1985 OSHA Analytical Methods Manual* and applicable method number (e.g., OSHA [#21]). "None available" indicates that no method has been developed by NIOSH or OSHA. The codes listed are explained in Table 1. Table 2 presents ordering information for the measurement methods cited.

Personal Protection and Sanitation

This column presents a summary of recommended practices for each toxic substance. These recommendations sup-

plement general work practices (e.g., no eating, drinking, or smoking where chemicals are used). Table 3 explains the codes used. Each category is described as follows:

- CLOTHING:** Describes conditions that require chemical protective clothing.
- GOGGLES:** Describes conditions that require eye protection.
- WASH:** Tells when workers should clean the spilled chemical from the body (in addition to normal washing before eating, smoking, etc.).
- CHANGE:** Tells when routine changes of clothing are advisable.
- REMOVE:** Advises workers when to remove clothing that has been accidentally contaminated.
- PROVIDE:** Recommends the availability of eyewash and quick drench equipment.

Recommendations for Respirator Selection

This column provides a condensed table of allowable respirator use. Each line lists in ppm or mg/m³ a maximum concentration for use (commonly referred to as MUC, maximum use concentration) or condition (i.e., emergency or planned entry into unknown concentrations or IDLH conditions [designated by the symbol §], or escape from suddenly occurring respira-

tory hazards) followed by a series of codes representing classes of respirators. Individual respirator codes are separated by diagonal marks (/). For each MUC, the table lists only those respirators that possess the minimum required protection factor and other use restrictions based on the *NIOSH Respirator Decision Logic* (DHHS [NIOSH] Publication No. 87-108). All recommended respirators of a given class can be used at any concentration equal to or less than the MUC listed for that class.

The recommendations for respirator selection for each substance are based on the most restrictive occupational exposure limit found among the NIOSH REL, the OSHA PEL, and the ACGIH TLV.

In the *Pocket Guide*, single-use respirators refer only to disposable respirators that have been tested under the provisions of 30 CFR 11.140-5 and that have an established protection factor of 5. To determine whether certain single-use respirators can be used for other applications, including those that require a higher protection factor, consult the *NIOSH Certified Equipment List* (DHHS [NIOSH] Publication No. 89-105). If a higher protection factor is required, the wearer must first be properly fitted with a respirator using either a quantitative fit test or the "improved" qualitative fit test, as accepted in the OSHA lead standard (29 CFR 1910.1025).

All respirators selected must be approved by NIOSH

and MSHA under the provisions of 30 CFR 11. Since an air-purifying respirator must be specifically approved by NIOSH and MSHA for use with pesticides, pesticides are not identified as such in the respirator selection tables.

In addition, a complete respiratory protection program must be implemented and must fulfill all requirements of 29 CFR 1910.134. At a minimum, a respiratory protection program should include regular training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and storage. Selection of a specific respirator within a given class of recommended respirators depends on the particular situation; this choice should be made only by a knowledgeable person. **REMEMBER:** air-purifying respirators will not protect users against oxygen-deficient atmospheres, and they are not to be used in IDLH conditions. The only respirators recommended for fire fighting are self-contained breathing apparatuses that have full facepieces and are operated in a pressure-demand or other positive-pressure modes. Additional information on the selection and use of respirators can be found in the *NIOSH Respirator Decision Logic* and the *NIOSH Guide to Industrial Respiratory Protection* (DHHS [NIOSH] Publication No. 87-116).

Codes for the various categories of respirators are defined in Table 4. In addition, the assigned protection factor (APF) is indicated for each respirator class.

Route of Health Hazard

This column lists the toxicologically important routes of entry for each substance, abbreviated as follows:

Inh	Inhalation
Abs	Skin absorption
Ing	Ingestion
Con	Skin and/or eye contact

Symptoms

This column lists the potential symptoms of exposure. Their abbreviations are defined in Table 5.

First Aid

This column lists first aid procedures for eye and skin contact, inhalation, and ingestion of the toxic substance. Abbreviations are defined in Table 6.

Target Organs

This column lists the organs that are affected by exposure to each substance. Abbreviations are defined in Table 5.

Table 1. — Codes for measurement methods

Code	Method/reagent	Code	Method/reagent
Collection method:*		Sample work-up:	
Ambersorb	Ambersorb® XE-347 tube	CCl ₄	Carbon tetrachloride
Bag	Gas collection bag	CFC-113	1,1,2-Trichloro-1,2,2-trifluoroethane
Bub	Bubbler	CHCl ₃	Chloroform
Carbo-B	Carbosieve® B tube	CH ₂ Cl ₂	Methylene chloride
Char	Charcoal tube	CH ₃ CN	Acetonitrile
Char (low-Ni)	Charcoal tube (low nickel content)	CH ₃ COOH	Acetic acid
Char (pet)	Charcoal tube (petroleum-based)	CS ₂	Carbon disulfide
Chrom	Chromosorb tube	DMF	Dimethylformamide
Dry tube	Drying tube	FeCl ₃	Ferric chloride
Filter	Particulate filter	HCl	Hydrochloric acid
Florisil	Florisil® tube	HCOOH	Formic acid
G-chrom P	Gas-chrom P® tube	HNO ₃	Nitric acid
Hydrar	Hydrar® sorbent tube	H ₂ O ₂	Hydrogen peroxide
Imp	Impinger	HPLC	High-pressure liquid chromatography
Mol-sieve	Molecular sieve tube	H ₂ SO ₄	Sulfuric acid
Porapak	Porapak® tube	KOH	Potassium hydroxide
Si gel	Silica gel tube	LTA	Low-temperature ashing
Tenax GC	Tenax® GC tube	Na ₂ CO ₃	Sodium carbonate
T-Sorb	Thermosorb® tube	NaHCO ₃	Sodium bicarbonate
Vertical elut	Vertical elutriator		
XAD	XAD® tube		

(Continued)

In the chemical listing, an asterisk following an adsorbent tube code (e.g., Char, Si gel*, XAD-2*, etc.) indicates that a special coating must be added. The figure "2" in parentheses following a collection device (e.g., Filter(2), Imp(2), Char(2), etc.) indicates that two are used in series.

Table 1. — Codes for measurement methods (Continued)

Code	Method/reagent	Code	Method/reagent
Sample work-up (continued):		GC/PID	GC with photoionization detection
NaOH	Sodium hydroxide	GC/TEA	GC with thermal energy analyzer detection
NH ₄ OH	Ammonium hydroxide	Grav	Gravimetric
Pho-acid	Phosphomolybdic acid	HGA	Flameless atomic absorption with a high-temperature graphite analyzer
Thermal desorp	Thermal desorption apparatus		
THF	Tetrahydrofuran	HPLC/FLD	High-pressure liquid chromatog- raphy with fluorescence detection
Analytical method:		HPLC/UVD	High-pressure liquid chromatog- raphy with ultraviolet detection
AA	Atomic absorption spectrometry	IC	Ion chromatography
ECA	Electrochemical analysis	ICP	Inductively coupled plasma
GC	Gas chromatography	IR	Infrared spectrometry
GC/AikFID	GC with alkaline flame ionization detection	ISE	Ion-specific electrode
GC/ECD	GC with electron capture detection	PCM	Phase contrast microscopy
GC/EConD	GC with electrolytic conductivity detection	PES	Plasma emission spectroscopy
GC/FID	GC with flame ionization detection	PLR	Polarography
GC/FPD	GC with flame photometric detection for sulfur, nitrogen, or phosphorus	Titrate	Titration
GC/NPD	GC with nitrogen/phosphorus detection	Vis	Visible spectrophotometry
		XRF	X-ray fluorescence spectrometry
		XRD	X-ray diffraction spectrometry

Table 2. — Ordering information for measurement methods

Manual	Publication No.	Ordering No.	Manual	Publication No.	Ordering No.	
NIOSH Manual of Analytical Methods, 2nd edition:	Vol. I	NIOSH 77-157-A	PB-274-845	Supplement to 3rd edition	NIOSH 85-117	PB-86-116-266
	Vol. II	NIOSH 77-157-B	PB-276-624	2nd supplement to 3rd edition	NIOSH 87-117	PB-88-204-722
	Vol. III	NIOSH 77-157-C	PB-276-838			
	Vol. IV	NIOSH 78-175	PB-83-105-437	3rd supplement to 3rd edition	NIOSH 89-127	PB-90-162-470
	Vol. V	NIOSH 79-141	PB-83-105-445			
	Vol. VI	NIOSH 80-125	PB-82-157-728			
	Vol. VII	NIOSH 82-100	PB-83-105-452	OSHA Analytical Methods Manual, 1985 edition	—	4540*, 4541 (fiche)*
NIOSH Manual of Analytical Methods, 3rd edition	NIOSH 84-100	PB-85-179-018				

*Denotes ordering number of the American Conference of Governmental Industrial Hygienists (ACGIH), 6500 Glenway Ave., Building D-7, Cincinnati, OH 45211 (513-661-7881). All other ordering numbers are for the National Technical Information Service (NTIS), Springfield, VA 22161 (703-487-4650).

Table 3. — Personal protection and sanitation codes

Code	Definition
CLOTHING	Wear appropriate equipment to prevent:
Any poss liq/Repeat vap	Any possibility of liquid contact and repeated or prolonged vapor contact with skin
Any poss	Any possibility of skin contact
Any poss wet	Any possibility that skin will become wet with contaminant
Any poss >x%/Repeat y%	Any possibility of skin contact with liquids containing >x% of contaminant and repeated or prolonged skin contact with liquids containing y%
Any poss pH <x/Repeat pH >x	Any possibility of skin contact with solutions having a pH <x and repeated or prolonged skin contact with solutions having a pH >x
Prevent skin freezing	Self explanatory
Prevent contam or freezing	Contamination or freezing of skin
Prevent wet or freezing	Wetting or freezing of skin
Repeat	Repeated or prolonged skin contact
Reason prob	Reasonable probability of skin contact
GOGGLES	Wear eye protection to prevent:
Any poss	Any possibility of eye contact
Any poss >x%/Reason prob <y%	Any possibility of eye contact with liquids containing >x% of contaminant and reasonable probability of eye contact with liquid containing <y%
Any poss molt/Reason prob liq-sol	Any possibility of eye contact with substance in a molten form and reasonable probability of eye contact with a liquid or solid containing the substance
Any poss (xxx)	Any possibility that substance xxx will contact the eyes

(Continued)

Table 3. — Personal protection and sanitation codes (Continued)

Code	Definition
GOGGLES (Continued)	
Reason prob	Reasonable probability of eye contact
Repeat	Repeated or prolonged eye contact
WASH	
Workers should wash:	
Daily	At the end of each work shift
Daily (reason prob)	At the end of each work shift when there is reasonable probability of contact with the contaminant
Immed contam	Immediately when skin becomes contaminated
Immed contam >x%/	Immediately when skin is contaminated with liquids containing >x% contaminant and promptly when skin is contaminated with y%
Prompt contam y%	
Immed contam >x%/	Immediately when skin is contaminated with liquids containing >x% contaminant and promptly when skin becomes wet with y%
Prompt wet y%	
Immed contam/daily	Immediately when skin becomes contaminated and at the end of each work shift
Immed contam pH <x/	Immediately when skin becomes contaminated with liquid of pH <x and promptly when skin becomes wet with liquid of pH >x
Prompt wet pH >x	
Immed wet	Immediately when skin becomes wet
Immed wet/Prompt contam	Immediately when skin becomes wet and promptly when skin becomes contaminated
Immed wet/Prompt contam/daily	Immediately when skin becomes wet, promptly when skin becomes contaminated, and at the end of each work shift

(Continued)

Table 3. — Personal protection and sanitation codes (Continued)

Code	Definition
WASH (Continued)	
Prompt contam	Promptly when skin becomes contaminated
Prompt contam/daily	Promptly when skin becomes contaminated and at the end of each work shift
Prompt wash soap	Promptly wash with soap when skin becomes contaminated
Prompt wet	Promptly when skin becomes wet
CHANGE	
Work clothing should be changed daily:	
After work if any poss contam	If there is any possibility that the clothing may be contaminated
After work if reason prob contam	If it is reasonably probable that the clothing may be contaminated
REMOVE	
Remove clothing:	
Immed contam	Immediately if it becomes contaminated
Immed wet	Immediately if it becomes wet
Immed wet (flamm)	Immediately if it becomes wet (to avoid flammability hazard)
Immed wet/immed	
non-imperv contam	Immediately if it becomes wet or if it is non-impervious clothing that becomes contaminated
Immed non-imperv contam	Immediately if it is non-impervious clothing that becomes contaminated
Immed non-imperv contam >x%/	
Prompt non-imperv contam y% ...	Immediately if it is non-impervious clothing that becomes contaminated with liquids containing >x% of contaminant and promptly if clothing is contaminated with y%

(Continued)

Table 3. — Personal protection and sanitation codes (Continued)

Code	Definition
REMOVE (Continued)	
Immed non-imperv wet/ prompt non-imperv contam	Immediately if it is non-impervious clothing that becomes wet and promptly if it is non-impervious clothing that becomes contaminated
Prompt non-imperv contam	Promptly if it is non-impervious clothing that becomes contaminated
Prompt non-imperv wet	Promptly if it is non-impervious clothing that becomes wet
PROVIDE	The following equipment should be available:
Eyewash	Self-explanatory
Quick drench	Self-explanatory
Eyewash (xxx)	Eyewash if substance xxx is present
Eyewash >x%	Eyewash if liquids containing >x% of contaminant are present
OTHER CODES	
Liq	Liquid
Molt	Molten
N.R.	No recommendation applies in this category
Sol	Solid
Soln	Solution containing the contaminant
Vap	Vapor

Table 4. — Symbols, code components, and codes used for respirator selection

Item	Definition
Symbol:	
Y	At any detectable concentration
§	Emergency or planned entry into unknown concentrations or IDLH conditions
£	Substance causes eye irritation or damage; eye protection needed
*	Substance reported to cause eye irritation or damage; may require eye protection
^	If not present as a fume
¿	Only nonoxidizable sorbents are allowed (not charcoal)
†	End of service life indicator (ESLI) required
APF	Assigned protection factor
Code component:	
CCR	Chemical cartridge respirator
D	Dust respirator (if an independent code); or a dust filter
F	Full facepiece
Fu	Fume filter
GMF	Air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister
M	Mist filter
PAPR	Powered, air-purifying respirator
SA	Supplied-air respirator
SCBA	Self-contained breathing apparatus
AG	Acid gas cartridge or canister
CF	Continuous flow mode

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

Item	Definition
Code component (continued):	
HiE	Air-purifying respirator with a high-efficiency particulate filter (if an independent code); or a high-efficiency particulate filter
HiEF	Air-purifying, full-facepiece respirator with a high-efficiency particulate filter
OV	Organic vapor cartridge or canister
PD,PP	Pressure-demand or other positive-pressure mode
S	Chemical cartridge or canister providing protection against the compound of concern
T	Tight-fitting facepiece
XS	Except single-use respirator
XSQ	Except single-use and quarter-mask respirator
Code:	
CCRFAGHIE (APF = 50)	Any chemical cartridge respirator with a full facepiece and acid gas cartridge(s) in combination with a high-efficiency particulate filter
CCRFOV (APF = 50)	Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)
CCRFOVDMFu (APF = 50)	Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a dust, mist, and fume filter
CCRFOVHIE (APF = 50)	Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter
CCRFS (APF = 50)	Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern
CCRFSHIE (APF = 50)	Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern and having a high-efficiency particulate filter

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

Item	Definition
Code (continued):	
CCROV (APF = 10)	Any chemical cartridge respirator with organic vapor cartridge(s)
CCROVAG (APF = 10)	Any chemical cartridge respirator with organic vapor and acid gas cartridge(s)
CCROVDM (APF = 10)	Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter
CCROVDMFu (APF = 10)	Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter
CROVHIE (APF = 10)	Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a high-efficiency particulate filter
CCRS (APF = 10)	Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern
D (APF = 5)	Any dust respirator
DM (APF = 5)	Any dust and mist respirator
DMF (APF = 10)	Any dust and mist respirator with a full facepiece
DMFu (APF = 10)	Any dust, mist, and fume respirator
DMXSQ (APF = 10)	Any dust and mist respirator except single-use and quarter-mask respirators
DXSQ (APF = 10)	Any dust respirator except single-use and quarter-mask respirators
GMFAG (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister
GMFAGHIE (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter
GMFOV (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

Item	Definition
Code (continued):	
GMFOVAG (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor and acid gas canister
GMFOVAGHiE (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor and acid gas canister having a high efficiency particulate filter
GMFOVDMFu (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister in combination with a dust, mist, and fume filter
GMFOVHiE (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter
GMFS (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern
GMFSHiE (APF = 50)	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter
HiE (APF = 10)	Any air-purifying respirator with a high-efficiency particulate filter
HiEF (APF = 50)	Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter
PAPRAG (APF = 25)	Any powered, air-purifying respirator with acid gas cartridge(s)
PAPRAGHiE (APF = 25)	Any powered, air-purifying respirator with acid gas cartridge(s) in combination with a high-efficiency particulate filter
PAPRD (APF = 25)	Any powered, air-purifying respirator with a dust filter
PAPRDM (APF = 25)	Any powered, air-purifying respirator with a dust and mist filter
PAPRDMFu (APF = 25)	Any powered, air-purifying respirator with a dust, mist, and fume filter

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

Item	Definition
Code (continued):	
PAPRHIE (APF = 25)	Any powered, air-purifying respirator with a high-efficiency particulate filter
PAPROV (APF = 25)	Any powered, air-purifying respirator with organic vapor cartridge(s)
PAPROVAG (APF = 25)	Any powered, air-purifying respirator with organic vapor and acid gas cartridge(s)
PAPROVDM (APF = 25)	Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter
PAPROVDMFu (APF = 25)	Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter
PAPRS (APF = 25)	Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern
PAPRTHIE (APF = 50)	Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
PAPRTOV (APF = 50)	Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)
PAPRTOVHIE (APF = 50)	Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter
PAPRTS (APF = 50)	Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern
SA (APF = 10)	Any supplied-air respirator
SA:CF (APF = 25)	Any supplied-air respirator operated in a continuous-flow mode
SAF (APF = 50)	Any supplied-air respirator with a full facepiece
SAF:PD,PP (APF = 2000)	Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(Continued)

Table 4. — Symbols, code components, and codes used for respirator selection (Continued)

Item	Definition
Code (continued):	
SAF:PD,PP:ASCBA (APF = 10,000)	Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode
SA:PD,PP (APF = 1000)	Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
SAT:CF (APF = 50)	Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
SCBA (APF = 10)	Any self-contained breathing apparatus
SCBAE	Any appropriate escape-type, self-contained breathing apparatus
SCBAF (APF = 50)	Any self-contained breathing apparatus with a full facepiece
SCBAF:PD,PP (APF = 10,000)	Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Table 5. — Abbreviations for symptoms of exposure and target organs

Abbreviation	Symptom/organ	Abbreviation	Symptom/organ
abdom	Abdominal	convuls	Convulsions
album	Albuminuria	CVS	Cardiovascular system
anes	Anesthesia	cyan	Cyanosis
anor	Anorexia	depres	Depressant/depression
anos	Anosmia	derm	Dermatitis
appre	Apprehension	diarr	Diarrhea
arrhy	Arrhythmias	dist	Disturbance
asphy	Asphyxia	dizz	Dizziness
BP	Blood pressure	drow	Drowsiness
breath	Breathing	dysp	Dyspnea
bron	Bronchitis	emphy	Emphysema
broncopneu	Bronchopneumonia	eosin	Eosinophilia
bronspas	Bronchospasm	epis	Epistaxis
BUN	Blood urea nitrogen	equi	Equilibrium
[carc]	Carcinogen	eryt	Erythema
card	Cardiac	euph	Euphoria
chol	Cholinesterase	fail	Failure
cirr	Cirrhosis	fasc	Fasciculation
CNS	Central nervous system	FEV	Forced expiratory volume
conf	Confusion	fib	Fibrosis
conj	Conjunctivitis	fibrl	Fibrillation
constip	Constipation	ftg	Fatigue
constric	Constriction	func	Function

(Continued)

Table 5. — Abbreviations for symptoms of exposure and target organs (Continued)

Abbreviation	Symptom/organ	Abbreviation	Symptom/organ
GI	Gastrointestinal	leupen	Leukopenia
gidd	Giddiness	li-head	Lightheadedness
halu	Hallucinations	low-wgt	Weight loss
head	Headache	mal	Malaise
hemato	Hematopoietic	malnut	Malnutrition
hemog	Hemoglobinuria	monocy	Monocytosis
hemorr	Hemorrhage	muc memb	Mucous membrane
hypox	Hypoxemia	musc	Muscle
incr	Increase(d)	narco	Narcosis
ict	Icterus	nau	Nausea
inco	Incoordination	nec	Necrosis
inflamm	Inflammation	neph	Nephritis
inj	Injury	ner	Nervousness
insom	Insomnia	numb	Numbness
irreg	Irregular	opac	Opacity
irrit	Irritation	palp	Palpitations
irrity	Irritability	para	Paralysis
jaun	Jaundice	pares	Paresthesia
kera	Keratitis	perf	Perforation
lac	Lacrimation	peri neur	Peripheral neuropathy
lar	Laryngeal	periorb	Periorbital
lass	Lassitude	phar	Pharyngeal
leucyt	Leukocytosis	photo	Photophobia

(Continued)

Table 5. — Abbreviations for symptoms of exposure and target organs (Continued)

Abbreviation	Symptom/organ	Abbreviation	Symptom/organ
pig	Pigmentation	subs	Substernal
pneu	Pneumonia	sweat	Sweating
pneuitis	Pneumonitis	swell	Swelling
PNS	Peripheral nervous system	sys	System
polyneur	Polyneuropathy	tacar	Tachycardia
prot	Proteinuria	tend	Tenderness
pulm	Pulmonary	trachbronc	Tracheobronchitis
RBC	Red blood cell	venfib	Ventricular fibrillation
resp	Respiratory	verti	Vertigo
retster	Retrosternal	vesic	Vesiculation
rhin	Rhinorrhea	vis dist	Visual disturbance
salv	Salivation	vomit	Vomiting
sens	Sensitization	weak	Weakness
sez	Seizure	wheez	Wheezing
som	Somnolence		

Table 6. — Codes for first aid data

Code	Definition	Code	Definition
Eye:		Medical attention . . .	Self-explanatory
lrr immed	If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.	Skin:	
lrr immed (15 min) . .	If this chemical contacts the eyes, immediately wash the eyes with large amounts of water and continue flushing for 15 minutes, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.	Dust off solid; water flush	If this solid chemical contacts the skin, dust it off immediately and then flush the contaminated skin with water. If this chemical or liquids containing this chemical penetrate the clothing, promptly remove the clothing and flush the skin with water. Get medical attention immediately.
lrr prompt	If this chemical contacts the eyes, promptly wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention if any discomfort continues. Contact lenses should not be worn when working with this chemical.	Medical attention for frostbite	If this chemical contacts the skin or mouth, stop the exposure immediately. If frostbite has occurred, get medical attention.
		Molten flush immed/ sol-liq soap wash prompt	If this molten chemical contacts the skin, immediately flush the skin with large amounts of water. Get medical attention immediately. If this chemi-

(Continued)

Table 6. — Codes for first aid data (Continued)

Code	Definition	Code	Definition
Skin (continued):			move the clothing and flush the skin with water. If irritation persists after washing, get medical attention.
	cal (or liquids containing this chemical) contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical or liquids containing this chemical penetrate the clothing, immediately remove the clothing and wash the skin with soap and water. If irritation persists after washing, get medical attention.	Soap prompt/molten flush immed	If this solid chemical or a liquid containing this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If irritation persists after washing, get medical attention. If this molten chemical contacts the skin or nonimpervious clothing, immediately flush the affected area with large amounts of water to remove heat. Get medical attention immediately.
Soap flush immed	If this chemical contacts the skin, immediately flush the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. If irritation persists after washing, get medical attention.	Soap wash	If this chemical contacts the skin, wash the contaminated skin with soap and water.
Soap flush prompt	If this chemical contacts the skin, promptly flush the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly re-	Soap wash immed	If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing,

(Continued)

Table 6. — Codes for first aid data (Continued)

Code	Definition	Code	Definition
Skin (continued):		Water flush	
	immediately remove the clothing, wash the skin with soap and water, and get medical attention promptly.	prompt	If this chemical contacts the skin, flush the contaminated skin with water promptly. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water promptly. If irritation persists after washing, get medical attention.
Soap wash		Water wash	
prompt	If this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly.	immed	If this chemical contacts the skin, immediately wash the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and wash the skin with water. If symptoms occur after washing, get medical attention immediately.
Water flush	If this chemical contacts the skin, flush the contaminated skin with water. Where there is evidence of skin irritation, get medical attention.	Water wash	
Water flush		prompt	If this chemical contacts the skin, promptly wash the contaminated skin with water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin
immed	If this chemical contacts the skin, immediately flush the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. Get medical attention promptly.		

(Continued)

Table 6. — Codes for first aid data (Continued)

Code	Definition	Code	Definition
Skin (continued):	with water. If irritation persists after washing, get medical attention.	Fresh air;	
Breath:		100% O ₂	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. When breathing is difficult, properly trained personnel may assist the affected person by administering 100% oxygen. Keep the affected person warm and at rest. Get medical attention as soon as possible.
Resp support	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.	Swallow:	
Fresh air	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. Other measures are usually unnecessary.	Medical attention immed . .	If this chemical has been swallowed, get medical attention immediately.

IV. CHEMICAL LISTING

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Acetaldehyde CH ₃ CHO 75-07-0 AB1925000	Acetic aldehyde, Ethanal, Ethyl aldehyde	NIOSH Ca See Appendix A OSHA 100 ppm (180 mg/m ³) ST 150 ppm (270 mg/m ³)	Ca [10,000 ppm]	Colorless liquid or gas (above 69°F) with a pungent, fruity odor.	MW: 44.1 BP: 69°F Sol: Miscible FLP: -36°F IP: 10.22 eV Sp.Gr: 0.79 Class IA Flammable Liquid	VP: 740 mm FRZ: -190°F UEL: 60% LEL: 4.0%	Strong oxidizers, acids, bases, alcohols, ammonia & amines, phenols, ketones, HCN, H ₂ S [Note: Prolonged contact with air may cause formation of peroxides that may explode and burst containers; easily undergoes polymerization.]	XAD-2; Toluene; GC/FID; III [#2538]
1089 26	1 ppm = 1.83 mg/m ³							
Acetic acid CH ₃ COOH 64-19-7 AF1225000	Acetic acid (aqueous), Ethanoic acid, Glacial acetic acid (pure compound), Methanecarboxylic acid [Note: Can be found in concentrations of 5-8% in vinegar.]	NIOSH 10 ppm (25 mg/m ³) ST 15 ppm (37 mg/m ³) OSHA 10 ppm (25 mg/m ³)	1000 ppm	Colorless liquid or crystals with a sour, vinegar-like odor. [Note: Pure compound is a solid below 62°F. Often used in an aqueous solution.]	MW: 60.1 BP: 244°F Sol: Miscible FLP: 102°F IP: 10.66 eV Sp.Gr: 1.05 Class II Combustible Liquid	VP: 11 mm FRZ: 62°F UEL(200°F): 19.9% LEL: 4.0%	Strong oxidizers (especially chromic acid, sodium peroxide & nitric acid), strong caustics [Note: Corrosive to metals.]	Char: HCOOH; GC/FID; III [#1603]
1842 29 (soln) 2790 50 (10-80% acid) 2789 29 (80% acid)	1 ppm = 2.50 mg/m ³							
Acetic anhydride (CH ₃ CO) ₂ O 108-24-7 AK1925000	Acetic acid anhydride, Acetic oxide, Acetyl oxide, Ethanoic anhydride	NIOSH/OSHA C 5 ppm (20 mg/m ³)	1000 ppm	Colorless liquid with a strong, pungent, vinegar-like odor.	MW: 102.1 BP: 282°F Sol: 12% FLP: 120°F IP: 10.00 eV Sp.Gr: 1.08 Class II Combustible Liquid	VP: 4 mm FRZ: -99°F UEL: 10.3% LEL: 2.7%	Water, alcohols, strong oxidizers (especially chromic acid), amines, strong caustics [Note: Corrosive to iron, steel & other metals. Reacts with water to form acetic acid.]	Bub; Reagent; Vis; III [#3506]
1715 39	1 ppm = 4.24 mg/m ³							
Acetone CH ₃ COCH ₃ 67-64-1 AL3150000	Dimethyl ketone, Ketone propane, 2-Propanone	NIOSH 250 ppm (590 mg/m ³) OSHA 750 ppm (1800 mg/m ³) ST 1000 ppm (2400 mg/m ³)	20,000 ppm	Colorless liquid with a fragrant, mint-like odor. [Note: Enforcement of the OSHA TWA for "doffers" in the cellulose acetate fiber industry was stayed on 9/5/89 until 9/1/90; further, the OSHA STEL does NOT apply to that industry.]	MW: 58.1 BP: 133°F Sol: Miscible FLP: 0°F IP: 9.69 eV Sp.Gr: 0.79 Class IB Flammable Liquid	VP: 180 mm FRZ: -140°F UEL: 13% LEL: 2.5%	Oxidizers, acids	Char: CS; GC/FID; III [#1300, Ketones I]
1090 26	1 ppm = 2.42 mg/m ³							

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Any poss Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash	NIOSH V, SCBAF; PD, PP; SAF; PD, PP; ASCBA Escape: GMFOV/SCBAE	Inh Ing	Eye, nose, throat irrit; conj; cough; CNS depres; eye, skin burns; derm; delayed pulm edema; [carc]	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, kidneys
Clothing: Any poss >50%/Repeat 10-49% Goggles: Any poss Wash: Immed contam >50%/ Prompt 10-49% Change: N.R. Remove: Immed non-imperv contam >50%/Prompt non- imperv contam 10-49% Provide: Eyewash (>5%)/Quick drench (>50%)	NIOSH/OSHA 250 ppm: SA, CF ⁴ /PAPROV ⁴ 500 ppm: CCRFOV/SCBAF/SAF/ GMFOV/PAPRTOV ⁴ 1000 ppm: SAF; PD, PP §: SCBAF; PD, PP; SAF; PD, PP; ASCBA Escape: GMFOV/SCBAE	Inh	Conj, lac; irrit nose, throat; phar edema, chronic bron; burns eyes, skin; skin sens; dental erosion; black skin, hyperkeratosis	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, eyes, teeth
Clothing: Reason prob Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 125 ppm: SA, CF ⁴ /PAPROV ⁴ 250 ppm: CCRFOV/SCBAF/SAF/ GMFOV/PAPRTOV ⁴ 1000 ppm: SAF; PD, PP §: SCBAF; PD, PP; SAF; PD, PP; ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Conj, lac, corneal edema, opac, photo; nasal, phar irrit; cough, dysp, bron; skin burns, vesic, sens derm	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH 1000 ppm: CCROV ⁴ /PAPROV ⁴ /SA/ SCBA* 6250 ppm: SA, CF* 12,500 ppm: GMFOV/SCBAF/SAF 20,000 ppm: SAF; PD, PP §: SCBAF; PD, PP; SAF; PD, PP; ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; head, dizz; derm	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin

Acetone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P., IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Acetonitrile CH ₃ CN 75-05-8 AL7700000	Cyanomethane, Ethyl nitrile, Methyl cyanide	NIOSH 20 ppm (34 mg/m ³) OSHA 40 ppm (70 mg/m ³) ST 60 ppm (105 mg/m ³)	4000 ppm ACGIH [skin]	Colorless liquid with an aromatic odor.	MW: 41.1 BP: 179°F Sol: Miscible Fl.P(oc): 42°F IP: 12.20 eV	VP: 73 mm FRZ: -49°F UEL: 16.0% LEL: 3.0%	Strong oxidizers	Char; Benzene; GC/FID; III [#1606]
1648 28	1 ppm = 1.71 mg/m ³				Sp.Gr: 0.78 Class IB Flammable Liquid			
2-Acetylaminofluorene C ₁₃ H ₁₃ N0 53-96-3 AB9450000	AAF, 2-AAF, 2-Acetylaminofluorene, N-Acetyl-2-aminofluorene, FAA, 2-FAA, 2-Fluorenylacetamide	NIOSH Ca See Appendix A OSHA [1910.1014] See Appendix B	Ca	Tan, crystalline powder.	MW: 223.3 BP: ? Sol: Insoluble Fl.P: ? IP: ?	VP: ? MLT: 381°F UEL: ? LEL: ?	None reported	None available
					Combustible Solid			
Acetylene tetrabromide CHBr ₂ CHBr ₂ 79-27-6 K18225000	Symmetrical tetrabromoethane; TBE; Tetrabromocetylene; Tetrabromoethane; 1,1,2,2-Tetrabromoethane	NIOSH See Appendix D OSHA 1 ppm (14 mg/m ³)	10 ppm	Pale-yellow liquid with a pungent odor. [Note: A solid below 32°F.]	MW: 345.7 BP: 474°F (Decomposes) Sol: 0.07% Fl.P: NA IP: ?	VP: 0.02 mm FRZ: 32°F UEL: NA LEL: NA	Strong caustics; hot iron; reducing metals such as aluminum, magnesium & zinc	Si gel; THe; GC/FID; III [#2003]
2504 58	1 ppm = 14.37 mg/m ³				Sp.Gr: 2.97 Noncombustible Liquid			
Acrolein CH ₂ =CHCHO 107-02-8 AS1050000	Acraldehyde, Acrylaldehyde, Acrylic aldehyde, Allyl aldehyde, Propenal, 2-Propenal	NIOSH/OSHA 0.1 ppm (0.25 mg/m ³) ST 0.3 ppm (0.8 mg/m ³)	5 ppm	Colorless or yellow liquid with a piercing, disagreeable odor.	MW: 56.1 BP: 127°F Sol: 40% Fl.P: -15°F IP: 10.13 eV	VP: 210 mm FRZ: -126°F UEL: 31% LEL: 2.8%	Oxidizers, acids, alkalis, ammonia, amines [Note: Polymerizes readily unless inhibited—usually with hydroquinone.]	XAD-2; Toluene; GC/NPD; III [#2501]
1092 30 (inhibited)	1 ppm = 2.33 mg/m ³				Sp.Gr: 0.84 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Quick drench	NIOSH 200 ppm: CCRFV/SA/SCBA 500 ppm: SA/CF/PAPROV 1000 ppm: GMFOV/SCBAF/SAF/ CCRFV 4000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Asphy; nau, vomit; chest pain; weak; stupor, convuls; eye irrit	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Kidneys, liver, CVS, CNS, lungs, skin, eyes
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: Alter work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Reduced function of liver, kidneys, bladder, pancreas, [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Liver, bladder, kidneys, pancreas, skin, lungs
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	OSHA 10 ppm: SA/SCBA §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose; anor, nau; severe head; abdom pain; jaun; monocy	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, upper resp sys, liver
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench	NIOSH/OSHA 2.5 ppm: SA/CF*/PAPROV* 5 ppm: CCRFV/GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, skin, muc memb; abnormal pulm fun; delayed pulm edema; chronic resp disease	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Heart, eyes, skin, resp sys

Acrolein

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Acrylamide $\text{CH}_2=\text{CHCONH}_2$ 79-06-1 AS3325000 2074 55	Acrylamide monomer, Acrylic amide, Propanamide, 2-Propanamide	NIOSH Ca See Appendix A 0.03 mg/m ³ [skin] OSHA 0.03 mg/m ³ [skin]	Ca [Unknown] ACGIH A2	White crystalline, odorless solid.	MW: 71.1 BP: 347-572°F (Decomposes) Sol(86°F): 216% Fl.P: 280°F IP: ? Sp.Gr(86°F): 1.12 Combustible Solid (may also be dissolved in flammable liquids).	VP: 0.007 mm MLT: 184°F UEL: ? LEL: ?	Strong oxidizers [Note: May polymerize violently upon melting.]	Filter/ Si gel; Methanol; GC/NPD; OSHA [#21]
Acrylonitrile $\text{CH}_2=\text{CHCN}$ 107-13-1 AT5250000 1093 30 (inhibited)	Acrylonitrile monomer, AN, Cyanoethylene, Propenenitrile, 2-Propanenitrile, VCN, Vinyl cyanide	NIOSH Ca See Appendix A 1 ppm C 10 ppm [15-min] [skin] OSHA [1910.1045] 2 ppm C 10 ppm [15-min] [skin]	Ca [500 ppm] ACGIH A2	Colorless to pale-yellow liquid with an unpleasant odor. [Note: Odor can only be detected above the PEL.]	MW: 53.1 BP: 171°F Sol: 7% Fl.P: 30°F IP: 10.91 eV Sp.Gr: 0.81 Class IB Flammable Liquid	VP: 83 mm FRZ: -118°F UEL: 17% LEL: 3.0%	Strong oxidizers, acids & alkalis; bromine; amines [Note: Unless inhibited (usually with methylhydroquinone) may polymerize spontaneously or when heated or in presence of strong alkali. Attacks copper.]	Char; Acetone/ CS; GC/FID; III [#1604]
Aldrin $\text{C}_{12}\text{H}_8\text{Cl}_6$ 309-00-2 IO2100000 2761 55	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-endo-exo-1,4,5,8-dimethanonaphthalene; HHDN; Octalene	NIOSH Ca See Appendix A 0.25 mg/m ³ [skin] OSHA 0.25 mg/m ³ [skin]	Ca [100 mg/m ³]	Colorless to dark brown crystalline solid with a mild chemical odor. [Note: Formerly used as an insecticide.]	MW: 364.9 BP: Decomposes Sol: 0.003% Fl.P: NA IP: ? Sp.Gr: 1.60 Noncombustible Solid, but may be dissolved in flammable liquids.	VP: 0.00008 mm MLT: 219°F UEL: NA LEL: NA	Concentrated mineral acids, active metals, acid catalysts, acid oxidizing agents, phenol	Filter/Bub; Isooctane; GC/EConD; III [#5502]
Allyl alcohol $\text{CH}_2=\text{CHCH}_2\text{OH}$ 107-18-6 BA5075000 1098 28	AA, Allylic alcohol, 1-Propene-3-ol, Propenol, 2-Propanol, Vinyl carbinol	NIOSH/OSHA 2 ppm (5 mg/m ³) ST 4 ppm (10 mg/m ³) [skin]	150 ppm	Colorless liquid with a pungent, mustard-like odor.	MW: 58.1 BP: 205°F Sol: Miscible Fl.P: 70°F IP: 9.63 eV Sp.Gr: 0.85 Class IB Flammable Liquid	VP: 17 mm FRZ: -200°F UEL: 18.0% LEL: 2.5%	Strong oxidizers, acid; carbon tetrachloride	Char; 2-Propanol/ CS; GC/FID; III [#1402, Alcohols III]

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Immed contam Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Quick drench		NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Ataxia, numb limbs, pares; musc weak; absent deep tendon reflex; hand sweat; hg, lethargy; irrit eyes, skin; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	CNS, PNS, skin, eyes
Clothing: Repeat Goggles: Reason prob Wash: Immed wet Change: N.R. Remove: Immed wet (flamm) Provide: Quick drench		NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Asphy; irrit eyes; head; sneezing; nau, vomit; weak, li-head; skin vesic; scaling derm; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water wash immed Resp support Medical attention immed	CVS, liver, kidneys, CNS, skin, brain tumor, lung and bowel cancer
Clothing: Any poss Goggles: Reason prob Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Quick drench		NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Head, dizz; nau, vomit, mal; myoclonic jerks of limbs; clonic, tonic convuls; coma; hema, azotemia; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Cancer, CNS, liver, kidneys, skin
Clothing: Any poss liq/Repeat vap >25 ppm Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Quick drench		NIOSH/OSHA 50 ppm: SA,CF*/PAPROV* 100 ppm: CCRFOV/GMFOV/SCBAF/SAF/PAPRTOV* 150 ppm: SAF:PD,PP E: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing	Eye irrit, tissue damage; irrit upper resp sys, skin; pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Eyes, skin, resp sys

Allyl alcohol

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Allyl chloride $\text{CH}_2=\text{CHCH}_2\text{Cl}$ 107-05-1 UC7350000	3-Chloropropene, 1-Chloro-2-propane, 3-Chloropropylene	NIOSH/OSHA 1 ppm (3 mg/m ³) ST 2 ppm (6 mg/m ³)	300 ppm	Colorless, brown, yellow, or purple liquid with a pungent, unpleasant odor.	MW: 76.5 BP: 113°F Sol: 0.4% Fl.P: -25°F IP: 10.05 eV	VP: 295 mm MLT: -210°F UEL: 11.1% LEL: 2.9%	Strong oxidizers, acids, amines, iron & aluminum chlorides, magnesium, zinc	Char; Benzene; GC/FID; III [#1000]
1100 28	1 ppm = 3.18 mg/m ³				Sp.Gr: 0.94 Class IB Flammable Liquid			
Allyl glycidyl ether $\text{C}_6\text{H}_{10}\text{O}_2$ 106-92-3 RR0875000	AGE: 1-Allyloxy-2,3-epoxypropane; Glycidyl allyl ether; [[2-Propenyloxy)methyl] oxirane	NIOSH 5 ppm (22 mg/m ³) ST 10 ppm (44 mg/m ³) [skin]	270 ppm	Colorless liquid with a pleasant odor.	MW: 114.2 BP: 309°F Sol: 14% Fl.P: 135°F IP: ?	VP: 2 mm FRZ: -148°F [forms glass] UEL: ? LEL: ?	Strong oxidizers	Tenax GC; Diethyl ether; GC/FID; II(4) [#S346]
2219 29	1 ppm = 4.75 mg/m ³	OSHA 5 ppm (22 mg/m ³) ST 10 ppm (44 mg/m ³)			Sp.Gr: 0.97 Class II Combustible Liquid			
4-Aminodiphenyl $\text{C}_6\text{H}_4\text{C}_6\text{H}_4\text{NH}_2$ 92-67-1 DU8925000	4-Aminobiphenyl, p-Aminobiphenyl, p-Aminodiphenyl, Biphenylamine, 4-Phenylaniline	NIOSH Ca See Appendix A OSHA [1910.1011] See Appendix B ACGIH A1 [skin]	Ca	Colorless crystals with a floral odor. [Note: Turns purple on contact with air.]	MW: 169.2 BP: 576°F Sol: Slight Fl.P: ? IP: ?	VP(227°F): 1 mm MLT: 127°F UEL: ? LEL: ?	None reported	Filter/ S: gel; 2-Propanol; GC/FID; II(4) [P&CAM #269]
2-Aminopyridine $\text{NH}_2\text{C}_4\text{H}_4\text{N}$ 504-29-0 US1575000	alpha-Aminopyridine, alpha-Pyridylamine	NIOSH/OSHA 0.5 ppm (2 mg/m ³)	5 ppm	White powder, leaflets, or crystals with a characteristic odor.	MW: 94.1 BP: 411°F Sol: >100% Fl.P: 154°F IP: 8.00 eV	VP: Low MLT: 137°F UEL: ? LEL: ?	Strong oxidizers	Tenax GC(2); Thermal desorp; GC/FID; II(4) [#S158]
2671 55	1 ppm = 3.91 mg/m ³				Combustible Solid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Quick drench	NIOSH/OSHA 25 ppm: SA/CF* 50 ppm: SCBAF/SAF 300 ppm: SAF/PD/PP ‡: SCBAF/PD/PP/SAF/PD/PP/ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, skin; pulm edema; in animals: liver, kidney damage	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, eyes, liver, kidneys
Clothing: Reason prob Goggles: Any poss Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam Provide: Eyewash	NIOSH/OSHA 50 ppm: SA/SCBA/CCROV 125 ppm: SA/CF*/PAPROV* 250 ppm: GMFOV/SCBAF/SAF/ CCRFOV/SAT/CF 270 ppm: SAF/PD/PP ‡: SCBAF/PD/PP/SAF/PD/PP/ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Derm; eye, nose irrit; pulm irrit, edema; narco	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Resp sys, skin
Clothing: Any poss Goggles: Immed contam/daily Wash: After work if any poss Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH v: SCBAF/PD/PP/SAF/PD/PP/ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Head, dizz; lethargy, dyps; ataxia, weak; methemoglobinemia; urinary burning; acute hemorrhagic cystitis; [canc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Bladder, skin
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Quick drench	NIOSH/OSHA 5 ppm: SA*/SCBA* ‡: SCBAF/PD/PP/SAF/PD/PP/ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Head, dizz; excitement; nau; high BP; resp distress; weak; convuls; stupor	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	CNS, resp sys

2-Aminopyridine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Ammonia NH ₃ 7664-41-7 BO0875000	Anhydrous ammonia, Aqua ammonia, Aqueous ammonia	NIOSH 25 ppm (18 mg/m ³) ST 35 ppm (27 mg/m ³) OSHA ST 35 ppm (27 mg/m ³)	500 ppm	Colorless gas with a pungent, suffocating odor. [Note: Often used in an aqueous solution. Easily liquefied under pressure.]	MW: 17.0 BP: -28°F Sol: 34% Fl.P: NA (Gas) IP: 10.18 eV	VP: >1 atm FRZ: -108°F UEL: 28% LEL: 15%	Strong oxidizers, acids, halogens, salts of silver & zinc [Note: Corrosive to copper & galvanized surfaces.]	Passive sampler; none; IC; III [#6701]
2672 60 (12-44% soln) 2073 15 (44% soln) 1005 15 (anhydrous)	1 ppm = 0.71 mg/m ³				Combustible Gas, but difficult to burn.			
Ammonium sulfamate NH ₄ SO ₃ NH ₂ 7773-06-0 WO6125000	Ammate® herbicide, Ammonium aminosulfonate, Monoammonium salt of sulfamic acid, Sulfamate	NIOSH/OSHA 10 mg/m ³ (total) 5 mg/m ³ (resp)	5000 mg/m ³	Colorless to white crystalline, odorless solid. [herbicide]	MW: 114.1 BP: 320°F (Decomposes) Sol: 200% Fl.P: NA IP: ?	VP: Low MLT: 268°F UEL: NA LEL: NA	Acids, hot water [Note: Elevated temperatures cause a highly exothermic reaction with water.]	Filter; Water; IC; III [#5348]
9089 31					Noncombustible Solid			
n-Amyl acetate CH ₃ COO(CH ₂) ₄ CH ₃ 628-63-7 AJ1925000	Amyl acetic ester, Amyl acetic ether, 1-Pentanol acetate, Pentyl ester of acetic acid, Primary amyl acetate	NIOSH/OSHA 100 ppm (525 mg/m ³)	4000 ppm	Colorless liquid with a persistent banana-like odor.	MW: 130.2 BP: 301°F Sol: 0.2% Fl.P: 77°F IP: ?	VP(77°F): 5 mm FRZ: -95°F UEL: 7.5% LEL: 1.1%	Nitrates; strong oxidizers, alkalis & acids	Char; CS ₂ ; GC/FID; III [#1450, Esters I]
1104 28	1 ppm = 5.41 mg/m ³				Sp.Gr: 0.88 Class IC Flammable Liquid			
sec-Amyl acetate CH ₃ COOCH(CH ₃)C ₂ H ₅ 626-38-0 AJ2100000	1-Methylbutyl acetate, 2-Pentanol acetate, 2-Pentyl ester of acetic acid	NIOSH/OSHA 125 ppm (650 mg/m ³)	9000 ppm	Colorless liquid with a mild odor.	MW: 130.2 BP: 249°F Sol: Slight Fl.P: 89°F IP: ?	VP: 7 mm FRZ: -148°F UEL: ? LEL: ?	Nitrates; strong oxidizers, alkalis & acids	Char; CS ₂ ; GC/FID; III [#1450, Esters I]
1104 26	1 ppm = 5.41 mg/m ³				Sp.Gr: 0.87 Class IC Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Any poss >10%/Repeat <10%	NIOSH 250 ppm: CCRS*/SA*/SCBA* 500 ppm: PAPRS*/SCBAF/SAF/ GMFS/CCRFS/SA/CF* §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh	Eye, nose, throat irrit; dysp, bronspas, chest pain; pulm edema; pink frothy sputum; skin burns, vesic	Eye:	Irr immed	Resp sys, eyes
Goggles:	Any poss		Ing		Skin:	Water flush immed	
Wash:	Immed contam >10%/ Prompt wet <10%		Con		Breath:	Resp support	
Change:	N.R.				Swallow:	Medical attention immed	
Remove:	Immed non-imperv >10%/ Prompt non-imperv contam <10%						
Provide:	Eyewash 10%, quick drench >10%						
Clothing:	N.R.	NIOSH/OSHA 50 mg/m ³ : DM 100 mg/m ³ : DMXSQ/SA 250 mg/m ³ : PAPRDM/SA/CF 500 mg/m ³ : HiEF/PAPRTHiE/ SAT,CF/SCBAF/SAF 5000 mg/m ³ : SA,PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HiEF/SCBAE	Inh	Irrit eyes, nose, throat; cough, difficult breath	Eye:	Irr immed	Upper resp sys, eyes
Goggles:	N.R.		Ing		Skin:	Soap wash prompt	
Wash:	N.R.		Con		Breath:	Resp support	
Change:	N.R.				Swallow:	Medical attention immed	
Remove:	N.R.						
Clothing:	Repeat	NIOSH/OSHA 1000 ppm: PAPROV*/CCROV*/SA*/ SCBA* 2500 ppm: SA/CF* 4000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh	Irrit eyes, nose; narco; derm	Eye:	Irr immed	Eyes, skin, resp sys
Goggles:	Reason prob		Ing		Skin:	Water flush prompt	
Wash:	Prompt wet		Con		Breath:	Resp support	
Change:	N.R.				Swallow:	Medical attention immed	
Remove:	Immed wet (flamm)						
Clothing:	Repeat	NIOSH/OSHA 1000 ppm: PAPROV*/CCROV* 1250 ppm: SA*/SCBA* 3125 ppm: SA/CF* 6250 ppm: GMFOV/SCBAF/SAF 9000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh	Irrit eyes, nose; narco; derm	Eye:	Irr immed	Resp sys, eyes, skin
Goggles:	Reason prob		Ing		Skin:	Water flush prompt	
Wash:	Prompt wet		Con		Breath:	Resp support	
Change:	N.R.				Swallow:	Medical attention immed	
Remove:	Immed wet (flamm)						

sec-Amyl acetate

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, Flammability	VP, FRZ, UEL, LEL		
Aniline and homologs $C_6H_5NH_2$ 62-53-3 BW6650000	Aminobenzene, Aniline oil, Benzenamine, Phenylamine	NIOSH Ca See Appendix A 2 ppm (8 mg/m ³) [skin] OSHA 2 ppm (8 mg/m ³) [skin]	Ca [100 ppm]	Colorless to brown oily liquid with an aromatic amine-like odor. [Note: A solid below 21°F.]	MW: 93.1 BP: 363°F Sol: 4% FLP: 158°F IP: 7.70 eV	VP: 0.6 mm FRZ: 21°F UEL: 11% LEL: 1.3%	Strong oxidizers, strong acids, toluene diisocyanate	Si gel; Ethanol; GC/FID; III [#2002, Aromatic Amines]
1547 57	1 ppm = 3.87 mg/m ³				Sp.Gr: 1.02 Class IIIA Combustible Liquid			
Anisidine (o-, p-isomers) $NH_2C_6H_4OCH_3$ o: 90-04-0 BZ5410000 p: 104-94-9 BZ5450000	o: ortho-Aminoanisole, 2-Anisidine, o-Methoxyaniline p: para-Aminoanisole, 4-Anisidine, p-Methoxyaniline	NIOSH Ca See Appendix A 0.5 mg/m ³ [skin] OSHA 0.5 mg/m ³ [skin]	Ca [50 mg/m ³]	o: Red or yellow oily liquid with an amine-like odor. [Note: A solid below 41°F.] p: Yellow to brown crystalline solid with an amine-like odor.	MW: 123.2 BP: 437/475°F Sol: Insoluble/ Moderate FLP: 244(oc)/ 86°F IP: 7.44 eV Sp.Gr: 1.10/1.07	VP: <0.1/ <0.1 mm FRZ/MLT: 41/135°F UEL: 7/? LEL: 7/?	Strong oxidizers	XAD-2; Methanol; HPLC/UVD; III [#2514]
2431 55	1 ppm = 5.12 mg/m ³				IP: 7.44 eV Sp.Gr: 1.10/1.07 o: Class IIIB Combustible Liquid p: Combustible Solid			
Antimony and compounds (as Sb) Sb 7440-36-0 (Metal) CC4025000 (Metal) 2871 53 (Sb powder)	Metal: Antimony powder, Stibium Synonyms of other compounds vary depending upon the specific compound.	NIOSH/OSHA 0.5 mg/m ³	80 mg/m ³	Metal: Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark gray, lustrous powder.	MW: 121.8 BP: 2975°F Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 1166°F UEL: NA LEL: NA	Strong oxidizers, acids, halogenated acids [Note: Stibine is formed when antimony is exposed to nascent (freshly formed) hydrogen.]	Filter; Acid; AA; II(4) [P&CAM #261]
ANTU $C_{12}H_{11}NHC(NH_2)S$ 86-88-4 YT9275000	alpha-Naphthyl thiocarbamide, 1-Naphthyl thiourea, alpha-Naphthyl thiourea	NIOSH/OSHA 0.3 mg/m ³	100 mg/m ³	White crystalline or gray odorless powder. [rodenticide]	MW: 202.3 BP: Decomposes Sol: 0.06% FLP: NA IP: ?	VP: Low MLT: 388°F UEL: NA LEL: NA	Strong oxidizers, silver nitrate	Filter; Methanol; HPLC/UVD; II(5) [S276]
1651 53					Noncombustible Solid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench	Reason prob Reason prob Immed contam N.R. Immed non-imperv contam Quick drench	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Head; weak, dizzy; cyan; ataxia; dyp on effort; tacar; eye irrit; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Blood, CVS, liver, kidneys
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Quick drench	Reason prob Reason prob Immed contam After work if reason prob contam Immed non-imperv contam Quick drench	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Head, dizzy; cyan; RBC Heinz bodies; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Blood, kidneys, liver, CVS
Clothing: Reason prob Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	Reason prob Reason prob Prompt contam After work if reason prob contam Prompt non-imperv contam	NIOSH/OSHA 5 mg/m ³ ; DMXSO ² /SA/SCBA 12.5 mg/m ³ ; PAPRDM ² /SA,CF 25 mg/m ³ ; HIEF/PAPRTHIE/ SAT,CF/SCBAF/SAF 80 mg/m ³ ; SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Con	Irrit nose, throat, mouth; cough; dizzy; head; nau, vomit, diarr; stomach cramps; insom; anor; irrit skin; unable to smell properly; cardiac abnormalities in antimony trichloride exposures	Skin: Breath: Swallow:	Soap wash immed Resp support Medical attention immed	Resp sys, CVS, skin, eyes
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: After work if reason prob contam Remove: N.R.	N.R. N.R. N.R. After work if reason prob contam N.R.	NIOSH/OSHA 3 mg/m ³ ; CCROVDMFu/SA/SCBA 7.5 mg/m ³ ; PAPROVDMFu/SA,CF 15 mg/m ³ ; CCRFOVHIE/PAPRTOVHIE/ SAT,CF/SCBAF/SAF/ GMFOVHIE 100 mg/m ³ ; SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Ing	After ingestion of large doses: vomit, dyp, cyan, coarse pulm rales; mild liver damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Arsenic (inorganic compounds as As)	Metal: Arsenia Synonyms of other compounds vary depending upon the specific compound. [Note: OSHA considers "inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except ARSINE.]	NIOSH Ca See Appendix A C 0.002 mg/m ³ [15-min]	Ca [100 mg/m ³]	Metal: Silver-gray or tin-white, brittle, odorless solid.	MW: 74.9 BP: Sublimes Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 1135EF (Sublimes) UEL: NA LEL: NA	Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]	Filter; Acid; AA; III [#7900]
7740-38-2 (Metal) CG0525000 (Metal)		OSHA [1910.1018] 0.010 mg/m ³			Sp.Gr: 5.73 Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.			
1558 53 (Metal)								
Arsine	Arsenic hydride, Arsenic trihydride, Arseniuretted hydrogen, Arsenious hydride, Hydrogen arsenide	NIOSH Ca See Appendix A C 0.002 mg/m ³ [15-min]	Ca [6 ppm]	Colorless gas with a mild garlic-like odor.	MW: 78.0 BP: -81°F Sol: 20% FLP: NA (Gas) IP: 9.69 eV	VP: >1 atm FRZ: -179°F UEL: ? LEL: ?	Strong oxidizers, chlorine, nitric acid [Note: Decomposes above 446°F. There is a high potential for the generation of arsine gas when inorganic arsenic is exposed to nascent (freshly formed) hydrogen.]	Char; HNO ₃ ; HGA; III [#6001]
Ash ₃		OSHA 0.05 ppm (0.2 mg/m ³)						
7784-42-1 CG6475000								
2188 18	1 ppm = 3.24 mg/m ³				Flammable Gas			
Asbestos	Actinolite, Amosite (cummingtonite-grunerite), Anthophyllite, Chrysotile, Crocidolite, Tremolite	NIOSH Ca See Appendix A See Appendix C	Ca	White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous, odorless solids.	MW: Varies BP: Decomposes Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 1112°F (Decomposes) UEL: NA LEL: NA	None reported	Filter; Acetone/ Triacetin; PCM; III [#7400, Fibers]
Hydrated mineral silicates		OSHA [1910.1001] OSHA [1910.1101] See Appendix C ACGIH See Appendix C						
1332-21-4 C16475000								
2212 31 (blue) 2590 31 (white)					Noncombustible Solid			[Note: Measurements may also be made with transmission electron microscopy using NIOSH #7402.]
Azinphos-methyl	Guthon®: 0,0-Dimethyl-S-4-gxo-1,2,3-benzotriazin-3(4H)-ylmethyl phosphorodithioate. Methyl azinphos [(CH ₃ O) ₂ P(S)SCH ₂ (N ₃ C ₇ H ₄ O)]	NIOSH/OSHA 0.2 mg/m ³ [skin]	20 mg/m ³	Colorless crystals or a brown, waxy solid. [insecticide]	MW: 317.3 BP: Decomposes Sol: 0.003% FLP: NA IP: ?	VP: Low MLT: 163°F UEL: NA LEL: NA	Strong oxidizers, acids	None available
C ₁₈ H ₁₂ O ₂ PS ₂ N ₃								
86-50-0 TE1925000								
2783 55					Sp.Gr: 1.44 Noncombustible Solid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if reason prob contam Remove: Immed contam Provide: Eyewash, quick drench		NIOSH Y: SCBAF:PD,PP/SAF:PD,PP-ASCBA Escape: GMFAGHIE/SCBAE	Inh Abs Con Ing	Ulceration of nasal septum, derm, GI disturbances, peri neur, resp irrit, hyperpig of skin, [carc]	Eye: Irr immed (15 min) Skin: Soap wash immed Swallow: Medical attention immed	Liver, kidneys, skin, lungs, lymphatic sys
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH Y: SCBAF:PD,PP/SAF:PD,PP-ASCBA Escape: GMFS/SCBAE	Inh	Head, malaise, weak, dizzy; dysp; abdom and back pain; nau, vomit; bronze skin; hema; jaun; peri neur; [carc]	Breath: Resp support	Blood, kidneys, liver
Clothing: Any poss Goggles: Reason prob Wash: Daily Change: After work if reason prob contam		NIOSH Y: SCBAF:PD,PP/SAF:PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing	Dysp, interstitial fb, restricted pulm function, finger clubbing, [carc]	Eye: Irr immed	Lungs
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: After work if any poss contam Remove: Immed non-perv contam Provide: Quick drench		NIOSH/OSHA 2 mg/m ³ : SA/SCBA/CCROVDMFu 5 mg/m ³ : PAPROVDMFu/SA:CF 10 mg/m ³ : CCRFOVHIE/PAPRTOVHIE/ SAT:CF/SCBAF/SAF/ GMFOVHIE 20 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Miosis; ache eyes; blurred vision, lac, rin; head; tight chest, wheez, lar spas; saliv; cyan; anor; nau, vomit, diarr; sweat; twitch, para, convuls; low BP, card irregularities	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, CNS, CVS, blood chol

Azinphos-methyl

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Recommendations vary depending upon the specific compound.	NIOSH/OSHA 5 mg/m ³ : DMXSQ/SA/SCBA 12.5 mg/m ³ : PAPRDM/SA/CF 25 mg/m ³ : HIEF/PAPRTHIE/SAT/CF/ SCBAF/SAF 250 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Upper resp irrit; gastroenteritis; muc spasm; slow pulse, extrasystoles; hypokalemia; irrit eyes, skin; skin burns	Eye: Skin: Breath: Swallow:	Irr Immed Water flush immed Resp support Medical attention immed	Heart, CNS, skin, resp sys, eyes
Clothing: Repeat Goggles: Reason prob Wash: Prompt wash soap Change: N.R. Remove: Immed wet (flamm)	NIOSH v: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, resp sys; gidd; head, nau, staggered gait; fig, anor, lass; derm; bone marrow depres; [carc]	Eye: Skin: Breath: Swallow:	Irr Immed Soap wash prompt Resp support Medical attention immed	Blood, CNS, skin, bone marrow, eyes, resp sys
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH v: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Hema; secondary anemia from hemolysis; acute cystitis; acute liver disorders; derm; painful and irregular urination; [carc]	Eye: Skin: Breath: Swallow:	Irr immed (15 min) Soap wash immed Resp support Medical attention immed	Bladder, kidneys, liver, skin, blood
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 50 mg/m ³ : DMXSQ*/SA*/SCBA* 125 mg/m ³ : PAPRDM*/SA/CF* 250 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIE* 7000 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit skin, eyes, muc memb; sens derm	Eye: Skin: Swallow:	Irr Immed Soap wash prompt Medical attention immed	Skin, resp sys, eyes

Benzoyl peroxide

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Benzyl chloride $C_6H_5CH_2Cl$ 100-44-7 XS8925000	Chloromethylbenzene, alpha-Chlorotoluene	NIOSH C 1 ppm (5 mg/m ³) (15-min) OSHA 1 ppm (5 mg/m ³)	10 ppm	Colorless to slightly yellow liquid with a pungent, aromatic odor.	MW: 126.6 BP: 354°F Sol: 0.05% Fl.P: 153°F IP: ?	VP(72°F): 1 mm FRZ: -38°F UEL: ? LEL: 1.1%	Oxidizers, acids, copper, aluminum, magnesium, iron, zinc, tin [Note: Can polymerize when in contact with all common metals except nickel & lead. Hydrolyzes in H ₂ O to benzyl alcohol.]	Char; CS; GC/FID; III [#1003, Halogenated Hydrocarbons]
1738 59	1 ppm = 5.26 mg/m ³				Sp.Gr: 1.10 Class IIIA Combustible Liquid			
Beryllium and compounds (as Be) Be 7440-41-7 DS1750000 1566 53 (cmpds) 1567 32 (powder)	Metal: None Synonyms vary depending upon the specific compound.	NIOSH Ca See Appendix A Not to exceed 0.0005 mg/m ³ OSHA 0.002 mg/m ³ C 0.005 mg/m ³ 0.025 mg/m ³ [30-min maximum peak]	Ca [10 mg/m ³] ACGIH A2	Metal: A hard, brittle, gray-white solid.	MW: 9.0 BP: 4532°F Sol: Insoluble Fl.P: NA IP: NA	VP: 0 mm (approx) MLT: 2349°F UEL: NA LEL: NA	Acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium	Filter; Acid; HGA; III [#7102]
Boron oxide B_2O_3 1303-86-2 ED7900000	Boric anhydride, Boric oxide, Boron trioxide	NIOSH/OSHA 10 mg/m ³	N.E.	Colorless, semi-transparent lumps or hard, white, odorless crystals.	MW: 69.6 BP: 3380°F Sol: 3% Fl.P: NA IP: NA	VP: 0 mm (approx) MLT: 842°F UEL: NA LEL: NA	Water [Note: Reacts slowly with water to form boric acid.]	Filter; none; Grav; III [#0500, Nuisance Dust (total)]
					Sp.Gr: 2.46 Noncombustible Solid			
Boron trifluoride BF_3 7637-07-2 ED2275000	Boron fluoride, Trifluoroborane	NIOSH/OSHA C 1 ppm (3 mg/m ³)	100 ppm	Colorless gas with a pungent, suffocating odor. [Note: Forms dense white fumes in moist air.]	MW: 67.8 BP: -148°F Sol: 100% (in cold H ₂ O) Fl.P: NA IP: 15.50 eV	VP: >1 atm FRZ: -196°F UEL: NA LEL: NA	Alkali metals, calcium oxide [Note: Hydrolyzes in moist air or hot water to form boric acid, hydrogen fluoride, and fluoboric acid.]	None available
1008 15	1 ppm = 2.82 mg/m ³				Nonflammable Gas			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Reason prob Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 10 ppm: SA*/PAPROVAG*/ CCROVAG*/GMFOVAG/SCBA* §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVAG/SCBAE	Inh Inj Con	Irrit eyes, nose; weak irrit; head; skin eruption; pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Eyes, resp sys, skin
Clothing: Repeat Goggles: Any poss Wash: Daily Change: After work if any poss contam Remove: Prompt non-imperv contam Provide: Eyewash	NIOSH Y: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh	Resp symptoms, weak, fig, weight loss, [carc]	Eye:	Irr immed	Lungs, skin, eyes, muc memb
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 50 mg/m ³ , DM* 100 mg/m ³ , DMXSC**/SA*/SCBA* 250 mg/m ³ , PAPRDM**/SA-CF* 500 mg/m ³ : SCBAF/SAF/HIEF/ PAPRTHIE* 5000 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Inj Con	Nasal irrit, conj, erythema	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Fresh air Medical attention immed	Skin, eyes
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 10 ppm: SA*/SCBA* 25 ppm: SA-CF* 50 ppm: SCBAF/SAF 100 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Con	Nasal irrit, epis; burns eyes, skin; in animals: pneu; kidney damage; epis	Eye: Skin: Breath:	Irr immed Water flush immed Resp support	Resp sys, kidneys, eyes, skin

Boron trifluoride

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Bromine Br ₂ 7726-95-6 EF9100000	Molecular bromine	NIOSH/OSHA 0.1 ppm (0.7 mg/m ³) ST 0.3 ppm (2 mg/m ³)	10 ppm	Dark reddish-brown fuming liquid with suffocating, irritating fumes.	MW: 159.8 BP: 133°F Sol: 4% FLP: NA IP: 10.55 eV	VP: 172 mm FRZ: 19°F UEL: NA LEL: NA	Combustible organics (sawdust, wood, cotton, straw, etc.), aluminum, readily oxidizable materials, ammonia, hydrogen, acetylene, phosphorus, potassium, sodium [Note: Corrodes iron, steel, stainless steel & copper.]	Bub; none; IC; OSHA (#D108)
1744 59	1 ppm = 6.64 mg/m ³				Sp.Gr: 3.12 Noncombustible Liquid, but accelerates the burning of combustibles.			
Bromoform CHBr ₃ 75-25-2 PBS600000	Methyl tribromide, Tribromomethane	NIOSH/OSHA 0.5 ppm (5 mg/m ³) [skin]	Unknown	Colorless to yellow liquid with a chloroform-like odor. [Note: A solid below 47°F.]	MW: 252.8 BP: 301°F Sol: 0.1% FLP: NA IP: 10.48 eV	VP: 5 mm FRZ: 47°F UEL: NA LEL: NA	Lithium, sodium, potassium, calcium, aluminum, zinc, magnesium, strong caustics, acetone [Note: Gradually decomposes, acquiring yellow color; air & light accelerate decomposition.]	Char; CS ₂ ; GC/FID; III #1003, Halogenated Hydrocarbons]
2515 58	1 ppm = 10.51 mg/m ³				Sp.Gr: 2.89 Noncombustible Liquid			
1,3-Butadiene CH ₂ =CHCH=CH ₂ 106-99-0 EI9275000	Biethylene, Biviny, Butadiene, Divinyl, Erythrene, Vinyl ethylene	NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration.	Ca [20,000 ppm] [LEL]	Colorless gas with a mild aromatic or gasoline-like odor. [Note: A liquid below 24°F.]	MW: 54.1 BP: 24°F Sol: Insoluble FLP: NA (Gas) c°F (Liquid) IP: 9.07 eV	VP: >1 atm FRZ: -164°F UEL: 12.0% LEL: 2.0%	Phenol, chlorine dioxide, copper, crotonaldehyde [Note: May contain inhibitors (such as tri-butylcatechol) to prevent self-polymerization. May form explosive peroxides upon exposure to air.]	Char[2]; CH ₂ Cl ₂ ; GC/FID; III #1024]
1010 17 (inhibited)	1 ppm = 2.25 mg/m ³	OSHA 1000 ppm (2200 mg/m ³)	ACGIH A2, 10 ppm (22 mg/m ³)		Sp.Gr: 0.65 (Liquid at 24°F) Flammable Gas Class IA Flammable Liquid			
2-Butanone CH ₃ COCH ₂ CH ₃ 78-93-3 EL6475000	Ethyl methyl ketone, MEK, Methyl acetone, Methyl ethyl ketone	NIOSH/OSHA 200 ppm (590 mg/m ³) ST 300 ppm (885 mg/m ³)	3000 ppm	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor.	MW: 72.1 BP: 175°F Sol: 26% FLP: 16°F IP: 9.54 eV	VP: 71 mm FRZ: -123°F UEL(200°F): 11.4% LEL(200°F): 1.4%	Strong oxidizers, amines, ammonia, inorganic acids, caustics, copper, isocyanates, pyridines	Ambersorb; CS ₂ ; GC/FID; III #2500]
1193/1232 26	1 ppm = 3.00 mg/m ³				Sp.Gr: 0.81 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed contam Provide: Eyewash, quick drench	NIOSH/OSHA 2.5 ppm: SA,CF ² /PAPRS ^{1,t} 5 ppm: CCRFS/GMFS/SCBAF/SAF PAPRTS ^{1,t} 10 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Dizz, head; lac, epis; cough, feeling of oppression, pulm edema, pneu; abdom pain, diarr; measles-like eruptions; severe burns eyes, skin	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, eyes, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 12.5 ppm: SA,CF ² /PAPROV ^{1,t} 25 ppm: CCRFOV/GMFOV/SCBAF/SAF/ PAPRTOV ^{1,t} 1000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing	Irrit eyes, resp sys; cough, feeling of damage CNS depression; liver damage	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Skin, liver, kidneys, resp sys, CNS
Clothing: Prevent skin freezing Goggles: Reason prob Wash: Immed wet Change: N.R. Remove: Immed wet (flamm)	NIOSH §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Con	Irrit eyes, nose, throat; drow, li-head; frostbite; [carc]	Eye: Skin: Breath: Irr immed Water flush immed Resp support	Eyes, resp sys, CNS
Clothing: Repeat Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Prompt non-imperv contam Provide: Eyewash	NIOSH/OSHA 1000 ppm: PAPROV ^{1,t} /CCRFOV 3000 ppm: GMFOV/SA,CF ² /SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose; head; dizz; vomit	Eye: Skin: Breath: Swallow: Irr immed Water wash immed Fresh air Medical attention immed	CNS, lungs

2-Butanone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, F.P., IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
2-Butoxyethanol $C_8H_{18}OCH_2CH_2OH$ 111-76-2 KJ8575000	Butyl cellosolve, Butyl oxitol, Dowanol EB, Ektasolve EB, Ethylene glycol monobutyl ether, Jeffersol EB	NIOSH/OSHA 25 ppm (120 mg/m ³) [skin]	700 ppm	Colorless mobile liquid with a mild ether-like odor.	MW: 118.2 BP: 339°F Sol: Miscible F.P.: 143°F IP: ?	VP: 0.8 mm FRZ: -107°F UEL(275°F): 12.7% LEL(200°F): 1.1%	Strong oxidizers, strong caustics	Char; Methanol/ CH_2Cl_2 ; GC/FID; III [#1403, Alcohols IV]
2369 26	1 ppm = 4.91 mg/m ³				Sp.Gr: 0.90 Class IIIA Combustible Liquid			
n-Butyl acetate $CH_3COO(CH_2)_3CH_3$ 123-86-4 AF7350000	Butyl acetate, n-Butyl ester of acetic acid, Butyl ethanoate	NIOSH/OSHA 150 ppm (710 mg/m ³) ST 200 ppm (950 mg/m ³)	10,000 ppm	Colorless liquid with a fruity odor.	MW: 116.2 BP: 258°F Sol: 1% F.P.: 72°F IP: 10.00 eV	VP(77°F): 15 mm FRZ: -107°F UEL: 7.6% LEL: 1.7%	Nitrates; strong oxidizers, alkalis & acids	Char; CS_2 ; GC/FID; III [#1450, Esters I]
1123 26	1 ppm = 4.83 mg/m ³				Sp.Gr: 0.88 Class IC Flammable Liquid			
sec-Butyl acetate $CH_3COOCH(CH_3)-$ CH_2CH_3 105-46-4 AF7360000	sec-Butyl ester of acetic acid, 1-Methylpropyl acetate	NIOSH/OSHA 200 ppm (950 mg/m ³)	10,000 ppm	Colorless liquid with a pleasant, fruity odor.	MW: 116.2 BP: 234°F Sol: 0.8% F.P.: 62°F IP: 9.91 eV	VP(77°F): 24 mm FRZ: -100°F UEL: 9.8% LEL: 1.7%	Nitrates; strong oxidizers, alkalis & acids	Char; CS_2 ; GC/FID; III [#1450, Esters I]
1123 26	1 ppm = 4.83 mg/m ³				Sp.Gr: 0.86 Class IB Flammable Liquid			
tert-Butyl acetate $CH_3COOC(CH_3)_3$ 540-88-5 AF7400000	tert-Butyl ester of acetic acid	NIOSH/OSHA 200 ppm (950 mg/m ³)	10,000 ppm	Colorless liquid with a fruity odor.	MW: 116.2 BP: 208°F Sol: Insoluble F.P.: 62-72°F IP: ?	VP: ? FRZ: ? UEL: ? LEL: ?	Nitrates; strong oxidizers, alkalis & acids	Char; CS_2 ; GC/FID; III [#1450, Esters I]
1123 26	1 ppm = 4.83 mg/m ³				Sp.Gr: 0.87 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench		NIOSH/OSHA 250 ppm: SA*/SCBA* 625 ppm: PAPROV*/SA,CF* 700 ppm: GMFOV/CCRFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; hemolysis, hemog	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Liver, kidneys, lymphoid sys, skin, blood, eyes, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV*/CCROV* 1500 ppm: SA*/SCBA* 3750 ppm: SA,CF* 7500 ppm: GMFOV/SCBAF/SAF 10,000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Head; drow; dryness and Irrit eyes, upper resp sys, skin	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV*/CCROV 5000 ppm: SA,CF* 10,000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes; head; drow; dryness upper resp sys, skin	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV*/CCRFOV 5000 ppm: SA,CF* 10,000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Itch, inflamm eyes; irrit upper resp tract; head; narco; derm	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes, skin

tert-Butyl acetate

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P., IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
n-Butyl alcohol $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ 71-36-3 EO1400000	1-Butanol, n-Butanol, Butyl alcohol, 1-Hydroxybutane, n-Propyl carbinol	NIOSH/OSHA C 50 ppm (150 mg/m ³) [skin]	8000 ppm	Colorless liquid with a strong, characteristic, mildly alcoholic odor.	MW: 74.1 BP: 243°F Sol: 9% Fl.P: 99°F IP: 10.04 eV	VP: 6 mm FRZ: -129°F UEL: 11.2% LEL: 1.4%	Strong oxidizers	Char; 2-Propanol/ CS; GC/FID; II [#1401, Alcohols I]
1120 26	1 ppm = 3.08 mg/m ³				Sp.Gr: 0.81 Class IC Flammable Liquid			
sec-Butyl alcohol $\text{CH}_3\text{CHOHCH}_2\text{CH}_3$ 78-92-2 EO1750000	2-Butanol, Butylene hydrate, 2-Hydroxybutane, Methyl ethyl carbinol	NIOSH 100 ppm (305 mg/m ³) ST 150 ppm (455 mg/m ³) OSHA 100 ppm (305 mg/m ³)	10,000 ppm	Colorless liquid with a strong, pleasant odor.	MW: 74.1 BP: 211°F Sol: 16% Fl.P: 75°F IP: 10.10 eV	VP(86°F): 24 mm FRZ: -175°F UEL(212°F): 9.8% LEL(212°F): 1.7%	Strong oxidizers	Char; 2-Propanol/ CS; GC/FID; III [#1401, Alcohols I]
1120 26	1 ppm = 3.08 mg/m ³				Sp.Gr: 0.81 Class IC Flammable Liquid			
tert-Butyl alcohol $(\text{CH}_3)_3\text{COH}$ 75-65-0 EO1925000	2-Methyl-2-propanol, Trimethyl carbinol	NIOSH/OSHA 100 ppm (300 mg/m ³) ST 150 ppm (450 mg/m ³)	8000 ppm	Colorless solid or liquid with a camphor-like odor. [Note: Pure compound is a liquid above 77°F. Often used in aqueous solutions.]	MW: 74.1 BP: 180°F Sol: Miscible Fl.P: 52°F IP: 9.70 eV	VP(77°F): 42 mm FRZ: 77°F UEL: 8.0% LEL: 2.4%	Strong mineral acids, strong hydrochloric acid, oxidizers	Char; 2-Butanol/ CS; GC/FID; III [#1400, Alcohols I]
1120 26	1 ppm = 3.08 mg/m ³				Sp.Gr: 0.79 Class IB Flammable Liquid			
Butylamine $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$ 109-73-9 EO2975000	1-Aminobutane, n-Butylamine	NIOSH/OSHA C 5 ppm (15 mg/m ³) [skin]	2000 ppm	Colorless liquid with a fishy, ammonia-like odor.	MW: 73.2 BP: 172°F Sol: Miscible Fl.P: 10°F IP: 8.71 eV	VP: 82 mm FRZ: -58°F UEL: 9.8% LEL: 1.7%	Strong oxidizers, strong acids [Note: May corrode some metals in presence of water.]	Si gel; Methanol; GC/FID; II(4) [#S138]
1125 68	1 ppm = 3.04 mg/m ³				Sp.Gr: 0.74 Class IA Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV ¹ /CCRFOV 1250 ppm: SA,CF ¹ 2500 ppm: GMFOV/SCBAF/SAF 8000 ppm: SAF-PD,PP § SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; head, vert, drow; corneal inflamm, blurred vision, lac, photo; dry cracked skin	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Skin, eyes, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV ¹ /CCRFOV/ SA ¹ /SCBA ¹ 2500 ppm: SA,CF ¹ 5000 ppm: GMFOV/SCBAF/SAF 10,000 ppm: SAF-PD,PP § SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Eye irrit, narco	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV ¹ /CCRFOV 2500 ppm: SA,CF ¹ 5000 ppm: GMFOV/SCBAF/SAF 8000 ppm: SAF-PD,PP § SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Drow; irrit skin, eyes	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench		NIOSH/OSHA 50 ppm: SA ¹ /SCBA ¹ /CCRS ¹ 125 ppm: SA,CF ¹ /PAPRS ¹ 250 ppm: CCRFS/GMFS/SCBAF/SAF/ PAPRTS ¹ 2000 ppm: SAF-PD,PP § SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; head; skin flush, burns	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, skin, eyes

Butylamine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
tert-Butyl chromate (as CrO ₃) (CH ₃) ₃ CO ₂ CrO ₂ 1189-85-1 GBZ900000	di-tert-Butyl ester of chromic acid	NIOSH Ca See Appendix A 0.001 mg/m ³ OSHA C 0.1 mg/m ³ [skin]	Ca [30 mg/m ³]	Liquid. [Note: Solidifies at 32-23°F.]	MW: 230.3 BP: ? Sol: ? FLP: ? IP: ?	VP: ? FRZ: 32-23°F UEL: ? LEL: ?	Reducing agents, moisture	None available
	1 ppm = 9.57 mg/m ³							
n-Butyl glycidyl ether C ₇ H ₁₄ O ₂ 2426-08-6 TX4200000	BGE; 1,2-Epoxy-3-butoxypropane	NIOSH C 5.6 ppm (30 mg/m ³) [15-min] OSHA 25 ppm (135 mg/m ³)	3500 ppm	Colorless liquid with an irritating odor.	MW: 130.2 BP: 327°F Sol: 2% FLP: 130°F IP: ? Sp.Gr(77°F): 0.91 Class II Combustible Liquid	VP(77°F): 3 mm FRZ: ? UEL: ? LEL: ?	Strong oxidizers, strong caustics	Char: CS; GC/FID; II(2) [#S81]
	1 ppm = 5.41 mg/m ³							
Butyl mercaptan CH ₃ CH ₂ CH ₂ CH ₂ SH 109-79-5 EK6300000	Butanethiol, 1-Butanethiol, n-Butanethiol, 1-Mercaptobutane	NIOSH C 0.5 ppm (1.8 mg/m ³) [15-min] OSHA 0.5 ppm (1.5 mg/m ³)	2500 ppm	Colorless liquid with a strong garlic-, cabbage-, or skunk-like odor.	MW: 90.2 BP: 209°F Sol: 0.06% FLP: 35°F IP: 9.15 eV Sp.Gr: 0.83 Class IB Flammable Liquid	VP: 35 mm FRZ: -176°F UEL: ? LEL: ?	Strong oxidizers (such as dry bleaches), acids	Chrom-104; Acetone; GC/FID; II(4) [#S350]
	1 ppm = 3.75 mg/m ³							
p-tert-Butyltoluene (CH ₃) ₂ CC ₂ H ₄ CH ₃ 98-51-1 XSB400000	1-Methyl-4-tert-butylbenzene	NIOSH/OSHA 10 ppm (60 mg/m ³) ST 20 ppm (120 mg/m ³)	1000 ppm	Colorless liquid with a distinct aromatic odor, somewhat like gasoline.	MW: 148.3 BP: 379°F Sol: Insoluble FLP: 155°F IP: 8.28 eV Sp.Gr: 0.86 Class IIIA Combustible Liquid	VP(77°F): 0.7 mm FRZ: -62°F UEL: ? LEL: ?	Oxidizers	Char: CS; GC/FID; III [#1501, Aromatic Hydrocarbons]
	1 ppm = 6.16 mg/m ³							

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench		NIOSH * SCBAF:PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Lung, sinus cancer; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, skin, eyes, CNS
Clothing: Any poss Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam		NIOSH 56 ppm: SA*/SCBA*/CCROV* 140 ppm: SA,CF*/PAPROV* 280 ppm: SCBAF/SAF/CCRFOV/ GMFOV/PAPRTOV* 3500 ppm: SAF-PD,PP ‡ SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose; skin irrit, sens; narco	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Eyes, skin, resp sys, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 5 ppm: SA/SCBA/CCROV 12.5 ppm: SA,CF/PAPROV 25 ppm: SCBAF/SAF/CCRFOV/ PAPRTOV/GMFOV 500 ppm: SA-PD,PP* 1000 ppm: SAF-PD,PP ‡ SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	In animals: narco, inco, weak; cyan, pulm irrit; liver, kidney damage	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys: In animals: CNS, liver, kidneys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet		NIOSH/OSHA 250 ppm: SA,CF*/PAPROV* 500 ppm: CCRFOV/GMFOV/SCBAF/SAF 1000 ppm: SAF-PD,PP ‡ SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, skin; dry nose, throat; head; low BP, tacr, abnormal cardiovascular stress; CNS depres; hemato depres	Eye: Skin: Breath: Swallow: Irr immed Water flush prompt Resp support Medical attention immed	CVS, CNS, skin, bone marrow, eyes, upper resp sys

o-tert-Butyltoluene

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL F.P., IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Cadmium dust (as Cd) Cd 7440-43-9 EU9600000	Metal: none Synonyms of other compounds vary depending upon the specific compound.	NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 0.2 mg/m ³ C 0.6 mg/m ³	Ca [50 mg/m ³]	Metal: Silver-white, blue-tinged lustrous, odorless solid.	MW: 112.4 BP: 1409°F Sol: Insoluble F.P.: NA IP: NA	VP: 0 mm (approx) MLT: 610°F UEL: NA LEL: NA	Strong oxidizers: elemental sulfur, selenium & tellurium	Filter: Acid; AA; III [#7048]
2570 53					Sp.Gr(77°F): 8.65 Metal: Noncombustible Solid in bulk form, but will burn in powder form.			
Cadmium fume (as Cd) CdO/Cd 1306-19-0 (CdO) EV1930000 (CdO)	CdO: Cadmium monoxide, Cadmium oxide fume Cd: None	NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 0.1 mg/m ³ C 0.3 mg/m ³	Ca [9 mg/m ³]	Odorless, yellow-brown, finely divided particulate dispersed in air.	MW: 128.4 BP: Decomposes Sol: Insoluble F.P.: NA IP: NA	VP: 0 mm (approx) MLT: 2599°F UEL: NA LEL: NA	Not applicable	Filter: Acid; AA; III [#7048]
					[Note: See Cadmium dust for properties of Cd.] Sp.Gr: 8.15 (crystalline form)/6.95 (amorphous form) Noncombustible Solid			
Calcium arsenate (as As) Ca ₃ (AsO ₄) ₂ 7778-44-1 CG0830000	Calcium salt (2:3) of arsenic acid, cucumber dust, tricalcium arsenate, tricalcium ortho-arsenate	NIOSH Ca See Appendix A 0.052 mg/m ³ [15-min] OSHA [1910.1018] 0.010 mg/m ³	Ca [100 mg/m ³]	Colorless to white, odorless solid. [insecticide/herbicide]	MW: 398.1 BP: Decomposes Sol(77°F): 0.01% F.P.: NA IP: NA	VP: 0 mm (approx) MLT: ? UEL: NA LEL: NA	None reported [Note: Produces toxic fumes of arsenic when heated to decomposition.]	Filter: Acid; AA; III [#7900, Arsenic]
1573 53					Sp.Gr: 3.62 Noncombustible Solid			
Calcium oxide CaO 1305-78-8 EW3100000	Burnt lime, Burnt lime, Lime, Pebble lime, Quick lime, Unslaked lime	NIOSH 2 mg/m ³ OSHA 5 mg/m ³	Unknown	White or gray, odorless lumps or granular powder.	MW: 56.1 BP: 5162°F Sol: Reacts F.P.: NA IP: NA	VP: 0 mm (approx) MLT: 4652°F UEL: NA LEL: NA	Water (liberates heat), fluorine [Note: Reacts with water to form calcium hydroxide.]	Filter: Acid; AA; III [#7020]
1910 60					Sp.Gr: 3.34 Noncombustible Solid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: N.R. Goggles: Any poss (CdCl ₂) Wash: Daily (reason prob) Change: After work if any poss contam Remove: N.R. Provide: Eyewash (CdCl ₂)	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Ing	Pulm edema, dysp, cough; chest tight, subs pain; head; chills, musc aches; nau, vomit, diarr; anos, emphy, prot, mild anemia; [carc]	Eye: Irr immed Skin: Soap wash Breath: Resp support Swallow: Medical attention immed	Resp sys, kidneys, prostate, blood
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh	Pulm edema, dysp, cough, tight chest, subs pain; head; chills, musc aches; nau, vomit, diarr; emphy, prot, anos, mild anemia; [carc]	Breath: Resp support	Resp sys, kidneys, blood
Clothing: Repeat Goggles: Any poss Wash: Prompt contam/daily Change: After work if any poss contam Remove: Prompt non-imprv contam	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Weak; GI dist; peri neur; skin hyperpig, palmar planter hyperkeratoses; derm; [carc] in animals: liver damage	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Eyes, resp sys, liver, skin, lymphatics, CNS
Clothing: Reason prob Goggles: Any poss Wash: Prompt contam/daily Change: After work if reason prob contam Remove: Prompt non-imprv contam Provide: Eyewash, quick drench	NIOSH 10 mg/m ³ : DM 20 mg/m ³ : DMXSO/SA/SCBA 50 mg/m ³ : PAPRHE/SA,CF 100 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE 250 mg/m ³ : SA:PD,PP ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit eyes, upper resp tract; ulcer, perf nasal septum; pneu; derm	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, eyes

Calcium oxide

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FL.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Camphor (synthetic) $C_{10}H_{16}O$ 76-22-2 EX1225000	2-Camphonone, Gum camphor, Laurel camphor, Synthetic camphor	NIOSH/OSHA 2 mg/m ³	200 mg/m ³	Colorless or white crystals with a penetrating, aromatic odor.	MW: 152.3 BP: 399°F Sol: Insoluble FL.P: 150°F IP: 8.76 eV	VP: 0.2 mm MLT: 345°F UEL: 3.9% LEL: 0.6%	Oxidizers (especially chromic anhydride)	Char: Methanol/ CS; GC/FID; III [#1301, Ketones I]
2717 32					Sp.Gr: 0.99 Combustible Solid			
Carbaryl (Sevin®) $C_{12}H_{16}OOCNHCH_3$ 63-25-2 FC5950000	alpha-Naphthyl N-methyl- carbamate, 1-Naphthyl N-Methyl- carbamate	NIOSH/OSHA 5 mg/m ³	600 mg/m ³	White or gray odorless solid. [pesticide]	MW: 201.2 BP: Decomposes Sol: 0.01% FL.P: NA IP: ?	VP(77°F): 0.00004 mm MLT: 293°F UEL: NA LEL: NA	Strong oxidizers, strongly alkaline pesticides	Filter: Reagent; Via; III [#5006]
2757 55					Sp.Gr: 1.23 Noncombustible Solid, but may be dissolved in flammable liquids.			
Carbon black C 1333-86-4 FF5800000	Acetylene black, Channel black, Furnace black, Lamp black, Thermal black	NIOSH/OSHA 3.5 mg/m ³ NIOSH Ca See Appendix A 0.1 mg/m ³ [Carbon black in presence of polycyclic aro- matic hydrocarbons]	N.E. Ca	Black, odorless solid.	MW: 12.0 BP: Sublimes Sol: Insoluble FL.P: ? IP: NA	VP: 0 mm (approx) MLT: Sublimes UEL: ? LEL: ?	Strong oxidizers such as chlorates, bromates & nitrates	Filter: none; Grav: III [#5000]
Carbon dioxide CO_2 124-38-9 FF6400000 1013 12 1845 21 (dry ice) 2187 21 (liquid)	Carbonic acid gas, Dry ice	NIOSH 5,000 ppm (9,000 mg/m ³) ST 30,000 ppm (54,000 mg/m ³) CSHA 10,000 ppm (18,000 mg/m ³) ST 30,000 ppm (54,000 mg/m ³)	50,000 ppm	Colorless, odorless gas. [Note: Normal constituent of air (about 3000 ppm). Solid form is utilized as dry ice.]	MW: 44.0 BP: Sublimes Sol(77°F): 0.2% FL.P: NA IP: 13.77 eV	VP: >1 atm MLT: -109°F (Sublimes) UEL: NA LEL: NA	Dusts of various metals, such as magnesium, zirconium, titanium, aluminum, chromium & manga- nese are ignitable and explosive when sus- pended in carbon dioxide.	Bag: none; GC/FID; III(3) [#5249]
	1 ppm = 1.83 mg/m ³				Noncombustible Gas			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 50 mg/m ³ : SA/CF/PAPROVDM ⁶ 100 mg/m ³ : CCRFOVHIE/GMFOVHIE/ PAPRTOVHIE ⁷ /SCBAF/SAF 200 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Ing Con	Irrit eyes, skin, muc memb; nau, vomit, diarr; head, dizz, excitement, irrational, epileptiform convuls	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	CNS, eye, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 50 mg/m ³ : SA*/SCBA* 125 mg/m ³ : SA-CF* 250 mg/m ³ : SCBAF/SAF 600 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Miosis, blurred vision, tear; nasal discharge, saliv; sweat; abdom cramps, nau, vomit, diarr; tremor; cyan; convuls; skin irrit	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, CNS, CVS, skin
Clothing: N.R. Goggles: Repeat Wash: Daily Change: N.R. Remove: N.R.	NIOSH/OSHA 17.5 mg/m ³ : DM 35 mg/m ³ : DMXSQ/SA/SCBA 87.5 mg/m ³ : PAPRDM/SA-CF 175 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF 1750 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Con	None expected; in presence of polycyclic aromatic hydrocarbons: [care] In presence of polycyclic aromatic hydrocarbons: NIOSH v: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Eye: Irr prompt	None known
Clothing: Prevent skin freezing Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH 50,000 ppm: SA/SCBA §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: SCBAE	Inh Con	Head, dizz, restless, pares; dysp; sweat, mal; inc heart rate, pulse pressure; elevated BP; coma; asphy; convuls at high concentrations; frostbite (dry ice)	Eye: Skin: Breath: Medical attention Medical attention for frostbite Resp support	Lungs, skin, CVS

Carbon dioxide

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TLWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Carbon disulfide CS ₂ 75-15-0 FF6650000 1131 28	Carbon bisulfide	NIOSH 1 ppm (3 mg/m ³) ST 10 ppm (30 mg/m ³) [skin] OSHA 4 ppm (12 mg/m ³) ST 12 ppm (36 mg/m ³) [skin]	500 ppm	Colorless to faint-yellow liquid with a sweet ether-like odor. [Note: Reagent grades are foul smelling.]	MW: 76.1 BP: 116°F Sol: 0.3% FLP: -22°F IP: 10.08 eV Sp.Gr: 1.26 Class IB Flammable Liquid	VP: 297 mm FRZ: -169°F UEL: 50.0% LEL: 1.3%	Strong oxidizers; chemically-active metals such as sodium, potassium & zinc; acids; rust; halogens; amines [Note: Vapors may be ignited by contact with ordinary light bulb.]	Char/ Dry tube; Toluene; GC/FID; II [#1600]
Carbon monoxide CO 630-08-0 FG3500000 1016 18	Carbon oxide, Flue gas, Monoxide	NIOSH/OSHA 35 ppm (40 mg/m ³) C 200 ppm (229 mg/m ³) [Note: On 9/5/89 OSHA stayed the start-up date for the Ceiling limit for the following steel industry operations — blast furnaces, vessel blowing at basic oxygen furnaces, and sinter plants.]	1500 ppm	Colorless, odorless gas. [Note: Shipped as a nonliquefied compressed gas.]	MW: 28.0 BP: -313°F Sol: 0% FLP: NA (Gas) IP: 14.01 eV Flammable Gas	VP: >1 atm M.L.T.: -337°F UEL: 74% LEL: 12.5%	Strong oxidizers, bromine trifluoride, chlorine trifluoride, lithium	Bag; none; ECA; II(4) [#S340]
Carbon tetrachloride CCl ₄ 56-23-5 FG4900000 1846 55	Carbon chloride, Carbon tet, Freon [®] 10, Halon [®] 104, Tetrachloromethane	NIOSH Ca See Appendix A ST 2 ppm (12.6 mg/m ³) [60-min] OSHA 2 ppm (12.6 mg/m ³)	Ca [300 ppm]	Colorless liquid with a characteristic ether-like odor.	MW: 153.8 BP: 170°F Sol: 0.05% FLP: NA IP: 11.47 eV Sp.Gr: 1.59 Noncombustible Liquid	VP: 91 mm FRZ: -9°F UEL: NA LEL: NA	Chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum [Note: Forms highly toxic phosgene gas when exposed to flames or welding arcs.]	Char; CS ₂ ; GC/FID; II [#1003, Halogenated toxic phosgene gas when exposed to flames or welding arcs.]
Chlordane C ₁₂ H ₆ Cl ₈ 57-74-9 PB9800000 2762 28	1,2,4,5,6,7,8,8- Octachloro-3a,4,7,7a- tetrahydro-4,7- methanoindane	NIOSH Ca See Appendix A 0.5 mg/m ³ [skin] OSHA 0.5 mg/m ³ [skin]	Ca [500 mg/m ³]	Amber-colored, viscous liquid with a pungent, chlorine-like odor. [Insecticide]	MW: 409.8 BP: Decomposes Sol: Insoluble FLP: NA IP: ? Sp.Gr(77°F): 1.56 Noncombustible Liquid, but may be utilized in flammable solutions.	VP: 0.0001 mm FRZ: ? UEL: NA LEL: NA	Strong oxidizers, alkaline reagents	Filter/ Chrom-102; Toluene; GC/ECD; II [#5510]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Reason prob Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH 10 ppm: CCROV/SA/SCBA 25 ppm: SA-CF/PAPROV 50 ppm: CCRFOV/PAPRTOV/GMFOV/ SCBAF/SAF 500 ppm: SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Dizz, head, poor sleep, fig, ner, anor, low-wgt; psychosis; polyneur; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis, kidney, liver damage; eye, skin burns; derm	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	CNS, PNS, CVS, eyes, kidneys, liver, skin
Clothing: Prevent skin freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 350 ppm: SA/SCBA 875 ppm: SA-CF 1500 ppm: SCBAF/SAF/GMFS* §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Abs Con (lq)	Head, tachypnea, nau, weak, dizz, conf, halu; cyan; depress S-T segment of electrocardiogram, angina, syncope	Breath:	Resp support	CVS, lungs, blood, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv contam	NIOSH †: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	CNS depres; nau, vomit; liver, kidney damage; skin irrit; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	CNS, eyes, lungs, liver, kidneys, skin
Clothing: Any poss Goggles: Reason prob Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Quick drench	OSHA †: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Blurred vision; conf; ataxia, delirium; cough; abdom pain, nau, vomit, diarr; irrity, tremor, convuls; anuria; in animals: lung, liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	CNS, eyes, lungs, liver, kidneys, skin

Chlordane

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL F.P., IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Chlorinated camphene $C_{12}H_{14}Cl_2$ 8001-35-2 XWS250000	Chlorocamphene, Octachlorocamphene, Polychlorocamphene, Toraphene	NIOSH Ca See Appendix A [skin] OSHA 0.5 mg/m ³ ST 1 mg/m ³ [skin]	Ca [200 mg/m ³]	Amber, waxy solid with a mild chlorine- and camphor-like odor. [insecticide]	MW: 413.8 BP: Decomposes Sol: 0.0003% F.P.: 275°F IP: ?	VP(77°F): 0.4 mm MLT: 149 to 194°F UEL: ? LEL: ?	Strong oxidizers [Note: Slightly corrosive to metals under moist conditions.]	Filter; Petroleum ether; GC/ECD; II(2) [#567]
2761 55					Sp.Gr(77°F): 1.65 A Solid that does not burn, or burns with difficulty.			
Chlorinated diphenyl oxide $(C_{12}H_8Cl_2)_2O$ 55720-99-5 K00875000	Hexachlorodiphenyl oxide, Hexachlorophenyl ether	NIOSH/OSHA 0.5 mg/m ³	Unknown	Light yellow, very viscous, waxy liquid.	MW: 376.9 BP: 448-500°F Sol: 0.1% F.P.: NA IP: ?	VP: 0.00006 mm FRZ: ? UEL: NA LEL: NA	Strong oxidizers	Filter; Isocotane; GC/EConD; III [#5025, Chlorinated diphenyl ether]
	1 ppm = 15.67 mg/m ³				Sp.Gr: 1.60 Noncombustible Liquid			
Chlorine Cl_2 7782-50-5 FO2100000	Molecular chlorine	NIOSH/OSHA 0.5 ppm (1.5 mg/m ³) ST 1 ppm (3 mg/m ³)	30 ppm	Greenish-yellow gas with a pungent, irritating odor. [Note: Shipped in steel cylinders.]	MW: 70.9 BP: -29°F Sol: 0.7% F.P.: NA IP: 11.48 eV	VP: >1 atm FRZ: -150°F UEL: NA LEL: NA	Reacts explosively or forms explosive compounds with many common substances such as acetylene, ether, turpentine, ammonia, fuel gas, hydrogen & finely divided metals.	Bub; none; ISE; OSHA [#ID101]
1017 20	1 ppm = 2.95 mg/m ³				Noncombustible Gas, but a strong oxidizer.			
Chlorine dioxide ClO_2 10049-04-4 FO3000000	Chlorine oxide, Chlorine peroxide	NIOSH/OSHA 0.1 ppm (0.3 mg/m ³) ST 0.3 ppm (0.9 mg/m ³)	10 ppm	Yellow to red gas or a red-brown liquid (below 52°F) with an unpleasant odor similar to chlorine and nitric acid.	MW: 67.5 BP: 52°F Sol(77°F): 0.3% F.P.: NA (Gas) ? (Liquid) IP: 10.36 eV	VP: >1 atm FRZ: -74°F UEL: ? LEL: ?	Organic materials, heat, phosphorus, potassium hydroxide, sulfur [Note: Unstable in light. A powerful oxidizer.]	None available
	1 ppm = 2.81 mg/m ³				Sp.Gr: 1.6 (Liquid at 32°F) Combustible Gas/Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection -- maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss liq/Repeat sol Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam sol Remove: Prompt non-imperv contam Provide: Quick drench	NIOSH 5: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Nau, conf, agitation, tremors, convuls, unconscious; dry, red skin; [care]	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	CNS, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 5 mg/m ³ : SA/SCBA 6: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVAGHIE/SCBAE	Inh Ing Con	Acne-form derm, liver damage	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Skin, liver
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 5 ppm: CCRS*/SA*/SCBA* 12.5 ppm: SA,CF*/PAPRS* 25 ppm: SCBAF/SAF/GMFS/PAPRTS*/CCRS 30 ppm: SAF-PD,PP 6: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Con	Burning of eyes, nose, mouth; lac, rin; cough, choking, subs pain; nau, vomit; head, dizz; syncope; pulm edema; pneu; hypox; derm; eye, skin burns	Eye: Irr immed Skin: Water flush immed Breath: Resp support	Resp sys
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed contam Provide: Eyewash, quick drench	NIOSH/OSHA 1 ppm: CCRS 2.5 ppm: SA,CF*/PAPRS† 5 ppm: CCRFS/GMFS*/SCBAF/SAF 10 ppm: SAF-PD,PP 6: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape GMFS*/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; cough, wheez, bron, pulm edema, chronic bron	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes

Chlorine dioxide

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL F.P., IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Chlorine trifluoride ClF_3 7790-91-2 FO2800000	Chlorine fluoride, Chlorotrifluoride	NIOSH/OSHA C 0.1 ppm (0.4 mg/m ³)	20 ppm	Colorless gas or a greenish-yellow liquid (below 53°F) with a somewhat sweet, suffocating odor.	MW: 92.5 BP: 53°F Sol: Reacts F.L.P.: NA IP: 13.00 eV	VP: >1 atm FRZ: -105°F UEL: NA LEL: NA	Oxidizers, water, acids, combustible materials, sand, glass [Note: Reacts with water to form chlorine and hydrofluoric acid.]	None available
1749 44	1 ppm = 3.85 mg/m ³				Sp.Gr: 1.77 (Liquid at 53°F) Noncombustible Liquid, but contact with organic materials may result in SPONTANEOUS ignition.			
Chloroacetaldehyde ClCH_2CHO 107-20-0 AB2450000	Chloroacetaldehyde (40% aqueous solution), 2-Chloroacetaldehyde, 2-Chloroethanal	NIOSH/OSHA C 1 ppm (3 mg/m ³)	100 ppm	Colorless liquid with an acrid, penetrating odor.	MW: 78.5 BP: 186°F Sol: Miscible F.L.P.: 190°F (40% soln) IP: 10.61 eV	VP: 100 mm FRZ: -3°F (40% soln) UEL: ? LEL: ?	Oxidizers, acids	SI gel; Methanol; GC/ECD; II(5) [§311]
2232 55	1 ppm = 3.26 mg/m ³				Sp.Gr: 1.19 Class IIIA Combustible Liquid			
alpha-Chloroacetophenone $\text{C}_6\text{H}_5\text{COCH}_2\text{Cl}$ 532-27-4 AM6300000	2-Chloroacetophenone, Chloromethyl phenyl ketone, Mace®, Phenacyl chloride, Phenyl chloromethyl ketone, Tear gas	NIOSH/OSHA 0.3 mg/m ³ (0.05 ppm)	100 mg/m ³	Colorless to gray crystalline solid with a sharp, irritating odor.	MW: 154.6 BP: 472°F Sol: Insoluble F.L.P.: 244°F IP: 9.44 eV	VP: 0.01 mm MLT: 134°F UEL: ? LEL: ?	Water, steam [Note: Slowly corrodes metals.]	Tenax GC (2); Thermal desorp; GC/FID; II(5) [P&CAM #291]
1697 58					Sp.Gr(59°F): 1.32 Combustible Solid			
Chlorobenzene $\text{C}_6\text{H}_5\text{Cl}$ 108-90-7 CZ0175000	Benzene chloride, Chlorobenzol, MCB, Monochlorobenzene, Phenyl chloride	NIOSH See Appendix D OSHA 75 ppm (350 mg/m ³)	2400 ppm	Colorless liquid with an almond-like odor.	MW: 112.6 BP: 270°F Sol: 0.85% F.L.P.: 85°F IP: 9.07 eV	VP(77°F): 12 mm FRZ: -50°F UEL: 9.6% LEL: 1.3%	Strong oxidizers	Char; CS; GC/FID; III [§1003, Halogenated Hydrocarbons]
1134 27	1 ppm = 4.68 mg/m ³				Sp.Gr: 1.11 Class IC Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection -- maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed contam Provide: Eyewash, quick drench	NIOSH/OSHA 2.5 ppm: SA,CF ⁴ 5 ppm: SCBAF/SAF 20 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Eye, skin burns; in animals: lac, corneal ulcer; pulm edema	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Skin, eyes
Clothing: Any poss >0.1%/Repeat Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 10 ppm: CCROV ⁴ /SA ⁴ /SCBA ⁴ 25 ppm: SA,CF ⁴ /PAPROV ⁴ 50 ppm: CCRFOV/GMFOV/SCBAF/SAF 100 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit skin, eyes, muc memb; skin burns; eye damage; pulm edema; skin, resp sys sens: narco, coma	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: Alter work if reason prob contam Remove: Immed non-imperv contam Provide: Eyewash	NIOSH/OSHA 3 mg/m ³ : CCROVDM 7.5 mg/m ³ : SA,CF ⁴ /PAPROVDM ⁴ 15 mg/m ³ : CCRFOVHIE/SCBAF/SAF 100 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Ing Con	Irrit eyes, skin, resp sys: pulm edema	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	OSHA 1000 ppm: PAPROV ⁴ /CCRFOV 1875 ppm: SA,CF ⁴ 2400 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit skin, eyes, nose; drow, inco; in animals: liver, lung, kidney damage	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes, skin, CNS, liver

Chlorobenzene

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
o-Chlorobenzylidene malonitrile $C_{10}H_7Cl-CH=C(CN)_2$ 2698-41-1 OO3675000	2-Chlorobenzalmalonitrile, CS, OCBM	NIOSH/OSHA C 0.05 ppm (0.4 mg/m ³) [skin]	2 mg/m ³	White crystalline solid with a pepper-like odor.	MW: 188.6 BP: 590-599°F Sol: Insoluble FL.P: ? IP: ?	VP: 1 mm MLT: 199-203°F UEL: ? LEL: ?	Strong oxidizers	Filter/ Tenax GC; Reagen; HPLC/UVD; II(S) [P&CAM #304]
Combustible Solid								
Chlorobromomethane CH_2BrCl 74-97-5 PAS250000	Bromochloromethane, CB, CBM, Fluorocarbon 1011, Halon® 1011, Methyl chlorobromide	NIOSH/OSHA 200 ppm (1050 mg/m ³)	5000 ppm	Colorless to pale yellow liquid with a chloroform-like odor.	MW: 129.4 BP: 155°F Sol: Insoluble FL.P: NA IP: 10.77 eV	VP (77°F): 160 mm FRZ: -124°F UEL: NA LEL: NA	Chemically-active metals such as calcium, powdered aluminum, zinc & magnesium	Char; CS; GC/IFID; III [#1003, Halogenated Hydro- carbons]
1887 58	1 ppm = 5.38 mg/m ³	Sp.Gr: 1.93 Noncombustible Liquid						
Chlorodiphenyl (42% chlorine) $C_{12}H_8Cl_2C_6H_4C_6H_4Cl_2$ (approx) 53469-21-9 TQ1356000	Aroclor® 1242, PCB, Polychlorinated biphenyl	NIOSH Ca See Appendix A 0.001 mg/m ³ OSHA 1 mg/m ³ [skin]	Ca [10 mg/m ³]	Colorless to light colored, viscous liquid with a mild hydrocarbon odor.	MW: 258(approx) BP: 617-691°F Sol: Insoluble FL.P: ? IP: ?	VP: 0.001 mm FRZ: -2°F UEL: ? LEL: ?	Strong oxidizers	Filter/ Florisil; Hexane; GC/ECD; III [#5503, PCBs]
2315 31	1 ppm = 10.72 mg/m ³	Sp.Gr(77°F): 1.39 Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.						
Chlorodiphenyl (54% chlorine) $C_{12}H_4Cl_4C_6H_4C_6H_4Cl_4$ (approx) 11097-69-1 TQ1360000	Aroclor® 1254, PCB, Polychlorinated biphenyl	NIOSH Ca See Appendix A 0.001 mg/m ³ OSHA 0.5 mg/m ³ [skin]	Ca [5 mg/m ³]	Colorless to pale yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.	MW: 326(approx) BP: 689-754°F Sol: Insoluble FL.P: ? IP: ?	VP: 0.00006 mm FRZ: 50°F UEL: ? LEL: ?	Strong oxidizers	Filter/ Florisil; Hexane; GC/ECD; III [#5503, PCBs]
2315 31	1 ppm = 13.55 mg/m ³	Sp.Gr(77°F): 1.38 Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.						

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam/daily Change: After work any poss contam Remove: Prompt non-imperv contam	NIOSH/OSHA 2 mg/m ³ : SA,CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVH/E/SCBAE	Inh Abs Ing Con	Pain, burn eyes, lac, conj; eryt eyelids, blepharospasm; irrit throat, cough, chest constrict; head; eryt, vesic skin	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	NIOSH/OSHA 1000 ppm: PAPROV ¹ /CCRFOV 5000 ppm: SA-CF ¹ /GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Disorientation, dizz; irrit eyes, throat, skin; pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, liver, kidneys, resp sys, CNS
Clothing: Any poss Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt contam non-imperv	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVH/E/SCBAE	Inh Abs Ing Con	Irrit eyes; chloracne; liver damage; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Skin, eyes, liver
Clothing: Any poss Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Prompt non-imperv wet	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVH/E/SCBAE	Inh Abs Ing Con	Irrit eyes, skin; acne-form dermat; [carc]; in animals: liver damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Skin, eyes, liver

Chlorodiphenyl (54% chlorine)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Chloroform CHCl ₃ 67-66-3 FS9100000	Methane trichloride, Trichloromethane	NIOSH Ca See Appendix A ST 2 ppm (9.78 mg/m ³) [60-min] OSHA 2 ppm (9.78 mg/m ³)	Ca [1000 ppm]	Colorless liquid with a pleasant odor.	MW: 119.4 BP: 143°F Sol(77°F): 0.5% FLP: NA IP: 11.42 eV	VP: 160 mm FRZ: -82°F UEL: NA LEL: NA	Strong caustics; chemically-active metals such as aluminum or magnesium powder, sodium & potassium; strong oxidizers [Note: When heated to decomposition, forms phosgene gas.]	Cher; CS; GC/FID; III [#1003, Halo- genated Hydro- carbons]
1888 55	1 ppm = 4.96 mg/m ³		ACGIH A2		Sp.Gr: 1.48 Noncombustible Liquid			
bis-Chloromethyl ether (CH ₂ Cl) ₂ O 542-88-1 KN1575000	BCME, bis-CME, Chloromethyl ether, Dichloromethyl ether, Dichlorodimethyl ether, Oxybis(chloromethane)	NIOSH Ca See Appendix A OSHA [1910.1008] See Appendix B	Ca	Colorless liquid with a suffocating odor.	MW: 115.0 BP: 223°F Sol: Reacts FLP: <66°F IP: ?	VP(72°F): 30 mm FRZ: -43°F UEL: ? LEL: ?	Acids, water [Note: Reacts with water to form hydrochloric acid and formaldehyde.]	Imp; Reagent; GC/ECD OSHA [#10]
2249 55	1 ppm = 4.78 mg/m ³		ACGIH A1, 0.001 ppm (0.005 mg/m ³)		Sp.Gr: 1.32 Class IA Flammable Liquid			
Chloromethyl methyl ether CH ₂ OCH ₂ Cl 107-30-2 KN6650000	Chlorodimethyl ether, Chloromethoxymethane, CMME, Dimethylchloroether, Methylchloromethyl ether	NIOSH Ca See Appendix A OSHA [1910.1006] See Appendix B	Ca	Colorless liquid with an irritating odor.	MW: 80.5 BP: 139°F Sol: Reacts FLP(oc): 32°F IP: 10.25 eV	VP: ? FRZ: -154°F UEL: ? LEL: ?	Water [Note: Reacts with water to form hydrochloric acid and formaldehyde.]	Imp; Hexane; GC/ECD; III(1) [P&CAM #220]
1239 28	1 ppm = 3.35 mg/m ³		ACGIH A2		Sp.Gr: 1.06 Class IA Flammable Liquid			
1-Chloro-1-nitropropane CH ₂ CH ₂ CHClNO ₂ 600-25-9 TX5075000	Korax, Lanstan [®]	NIOSH/OSHA 2 ppm (10 mg/m ³)	2000 ppm	Colorless liquid with an unpleasant odor, [fungicide]	MW: 123.6 BP: 289°F Sol: 0.5% FLP(oc): 144°F IP: ?	VP(77°F): 6 mm FRZ: ? UEL: ? LEL: ?	Strong oxidizers, acids	Chrom-108; Ethyl Acetate; GC/FID; III(5) [#S211]
	1 ppm = 5.14 mg/m ³				Sp.Gr: 1.21 Class IIIA Combustible Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection – maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Reason prob Goggles: Prompt wet Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv contam	NIOSH V: SCBAF-PD,PP,SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Dizz, mental dullness, nau, disorientation; head, lig, anes; hepatomegaly; irrit eyes, skin; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Liver, kidneys, heart, eyes, skin
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH V: SCBAF-PD,PP,SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Con	Irrit eyes, skin, muc memb of resp system; pulm congestion, edema; corneal damage, nec; reduced pulm function, cough, dysp, wheez; blood-stained sputum, bronchial secretions; [carc]	Eye: Skin: Breath: Swallow:	Ir immed (15 min) Soap wash immed Resp support Medical attention immed	Lungs, eyes, skin
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH V: SCBAF-PD,PP,SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Con	Irrit eyes, skin, muc memb; pulm edema, pulm congestion, pneu; burns, nec; cough, wheez, pulm congestion; blood stained-sputum; low-wgt; loss; bronchial secretions; [carc]	Eye: Skin: Breath: Swallow:	Ir immed (15 min) Soap wash immed Resp support Medical attention immed	Resp sys, skin, eyes, muc memb
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	NIOSH/OSHA 50 ppm: SA,CF*/PAP/PROV* 160 ppm: CCRFOV/GMFOV/SCBAF/SAF 2000 ppm: SAF-PD,PP §: SCBAF-PD,PP,SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	In animals: irrit eyes; pulm edema; liver, kidney, heart damage	Eye: Skin: Breath: Swallow:	Ir immed Soap wash Resp support Medical attention immed	In animals: resp sys, liver, kidneys, CVS

1-Chloro-1-nitropropane

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Chloropicrin CCl ₃ NO ₂ 76-06-2 PB6300000 1580 56 2929 52 (flam. mixture) 1583 56 (mixture)	Nitrochloroform, Nitrotrichloromethane, Trichloronitromethane	NIOSH/OSHA 0.1 ppm (0.7 mg/m ³)	4 ppm	Colorless to faint yellow, oily liquid with an intensely irritating odor. [pesticide]	MW: 164.4 BP: 234°F Sol: 0.2% FLP: NA IP: ?	VP: 20 mm FRZ: -93°F UEL: NA LEL: NA	Strong oxidizers [Note: With strong initiation, the heated material under confinement will detonate.]	None available
beta-Chloroprene CH ₂ =CClCH=CH ₂ 126-99-8 E19625000 1991 30 (inhibited)	2-Chloro-1,3-butadiene; Chlorobutadiene; Chloroprene	NIOSH Ca See Appendix A C 1 ppm (3.6 mg/m ³) [15 min] OSHA 10 ppm (35 mg/m ³) [skin]	Ca [400 ppm]	Colorless liquid with a pungent, ether-like odor.	MW: 88.5 BP: 139°F Sol: Slight FLP: -4°F IP: 8.79 eV	VP: 188 mm FRZ: -153°F UEL: 20.0% LEL: 4.0%	Peroxides & other oxidizers [Note: Polymerizes at room temperature unless inhibited with antioxidants.]	Char; CS; GC/FID; III [#1002]
Chromic acid and chromates (as CrO ₃) H ₂ CrO ₄ (acid) 7738-94-5 (acid) GB2450000 (acid) 1755 60 (acid soln) 1483 42 (acid, solid)	Chromic acid: none Synonyms of chromates (i.e., chromium(VI) compounds) vary depending upon the specific compound.	NIOSH Ca See Appendix A 0.001 mg/m ³ See Appendix C OSHA C 0.1 mg/m ³ See Appendix C ACGIH See Appendix C	Ca [30 mg/m ³]	Appearance and odor vary depending upon the specific compound.	Properties vary depending upon the specific compound. Chromic acid is noncombustible, but will accelerate the burning of combustible materials.		Chromic acid: Combustible, organic, or other readily oxidizable materials (paper, wood, sulfur, aluminum, plastics, etc.); corrosive to metals	Filter; Reagent; Vis. III [#7600, Hexavalent Chromium]
Chromium metal (as Cr) Cr 7440-47-3 GB4200000	Chrome, Chromium	NIOSH 0.5 mg/m ³ See Appendix C OSHA 1 mg/m ³ See Appendix C ACGIH See Appendix C	N.E.	Blue-white to steel-gray, lustrous, brittle, hard solid.	MW: 52.0 BP: 4788°F Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 3452°F UEL: NA LEL: NA	Strong oxidizers such as hydrogen peroxide, alkalis	Filter; Acid; AA; III [#7024]

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 2.5 ppm: SA/CF ¹ /PAPROV ² 4 ppm: SCBAF/SAF/CCRFOV/GMFOV §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Eye irrit, lac; cough, pulm edema; nau, vomit; skin irrit	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Any poss Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, resp sys; ner, irity; derm; alopecia; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Resp sys irrit, nasal septum perf; liver, kidney damage; leucyt, leupen, monocy, eosin; eye inj, conj; skin ulcer, sens derm; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap flush immed Resp support Medical attention immed	Blood, resp sys, liver, kidneys, eyes, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH 2.5 mg/m ³ : DM* 5 mg/m ³ : DMXSO ² /SA ¹ /SCBA* 12.5 mg/m ³ : PAPRDM ¹ /SA/CF* 25 mg/m ³ : HIEF/PAPRTHIE ¹ /SCBAF/SAF 500 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Ing	Histologic fibrosis of lungs	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Resp sys

Chromium metal (as Cr)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Chromium(II) and (III) compounds (as Cr)	Synonyms vary depending upon the specific Cr(II) or Cr(III) compound.	NIOSH/OSHA 0.5 mg/m ³ See Appendix C ACGIH See Appendix C	N.E.	Appearance and odor vary depending upon the specific compound.	Properties vary depending upon the specific compound.		Water	Filter; Acid; AA; III [#7024]
Coal tar pitch volatiles (benzene-soluble fraction) 65996-93-2 GF8655000	Synonyms vary depending upon the specific compound (e.g., benzo(a)pyrene, phenanthrene, acridine, chrysene, anthracene & pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]	NIOSH Ca See Appendix A 0.1 mg/m ³ (cyclohexane-extractable fraction) See Appendix C OSHA 0.2 mg/m ³	Ca [700 mg/m ³]	Black or dark-brown amorphous residue.	Properties vary depending upon the specific compound. Combustible Solid		Strong oxidizers	Filter; Benzene; Grav; III [#5023]
Cobalt metal, dust, and fume (as Co) Co 7440-48-4 (Metal) GF8750000 (Metal)	Metal: none Synonyms of other compounds vary depending upon the specific compound.	NIOSH/OSHA 0.05 mg/m ³	20 mg/m ³	Metal: Odorless, silver-gray to black solid.	MW: 58.9 BP: 5612°F Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 2719°F UEL: NA LEL: NA	Strong oxidizers, ammonium nitrate	Filter; Acid; AA; III [#7027]
Copper dusts and mists (as Cu) Cu 7440-50-8 (Metal) GL5325000 (Metal)	Metal: none Synonyms of other compounds vary depending upon the specific compound.	NIOSH/OSHA 1 mg/m ³	N.E.	Metal: Reddish, lustrous, malleable, odorless solid.	MW: 63.5 BP: 4703°F Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 1981°F UEL: NA LEL: NA	Oxidizers, alkalis, sodium azide, acetylene	Filter; Acid; AA; III [#7029]
					Sp.Gr: 8.92 (Metal) Metal: Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.			
					Sp.Gr: 8.94 (Metal) Metal: Noncombustible Solid in bulk form, but powdered form may ignite.			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 2.5 mg/m ³ ; DM* 5 mg/m ³ ; DMXSO*/SA*/SCBA* 12.5 mg/m ³ ; PAPRDM*/SA,CF* 25 mg/m ³ ; HIEF/PAPRTHIE*/SCBAF/SAF 250 mg/m ³ ; SAF,PD,PP §; SCBAF,PD,PP/SAF,PD,PP,ASCBA Escape: HIEF/SCBAE	Ing Con	Sens derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Skin	
Clothing: Reason prob Goggles: Reason prob Wash: Daily (reason prob) Change: After work if reason prob contam Remove: N.R.	NIOSH §; SCBAF,PD,PP/SAF,PD,PP,ASCBA Escape: GMFOVHIE/SCBAE	Inh Con	Derm, bron, [carc]	Eye: Skin: Breath:	Irr immed Soap wash Resp support	Resp sys, bladder, kidneys, skin	
Clothing: Repeat Goggles: N.R. Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 0.25 mg/m ³ ; DM* 0.5 mg/m ³ ; DMXSO**/DMFu*/SA*/SCBA* 1.25 mg/m ³ ; PAPRDM**/SA,CF*/PAPRDMFu* 2.5 mg/m ³ ; HIEF/SCBAF/SAF 250 mg/m ³ ; SAF,PD,PP §; SCBAF,PD,PP/SAF,PD,PP,ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Cough, dysp, decrease pulm func; low-wgt; derm; diffuse nodular fibrosis; resp hypersensitivity	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Resp sys, skin	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt contam non-imperv	NIOSH/OSHA 5 mg/m ³ ; DM* 10 mg/m ³ ; DMXSO**/SA*/SCBA* 25 mg/m ³ ; PAPRDM*/SA,CF* 50 mg/m ³ ; HIEF/SCBAF/SAF/PAPRTHIE* 2000 mg/m ³ ; SAF,PD,PP §; SCBAF,PD,PP/SAF,PD,PP,ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit nasal muc memb, pharynx; nasal perforation; eye irrit; metallic taste; derm; in animals: lung, liver, kidney damage; anemia	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin, liver, kidneys, inc risk with Wilson's disease	

Copper dusts and mists (as Cu)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Copper fume (as Cu) CuO/Cu 7440-50-8 (Cu) 1317-38-0 (CuO) GL5350000 (Cu)	CuO: Black copper oxide, Copper monoxide, Copper(II) oxide, Cupric oxide Cu: none	NIOSH/OSHA 0.1 mg/m ³	N.E.	Finely divided black particulate dispersed in air. [Note: Exposure may occur in copper & brass plants and during the welding of copper alloys.]	MW: 79.5 BP: Decomposes Sol: Insoluble F.L.P.: NA IP: NA [Note: See Copper Dusts & Mists for properties of Cu.] Sp.Gr: 6.4 (CuO) CuO: Noncombustible Solid	VP: 0 mm (approx) MLT: 1879°F (Decomposes) UEL: NA LEL: NA	Acetylene	Filter; Acid; AA; III [#7029]
Cotton dust (raw) GN2275000	None	NIOSH 0.200 mg/m ³ See Appendix C OSHA [2-1-A & 1910.1043] 1 mg/m ³ (waste processing during waste recycling [sorting, blending, cleaning & wilowing] & garretting) 0.200 mg/m ³ (textile yarn manufacturing) 0.750 mg/m ³ (textile slashing & weaving) 0.500 mg/m ³ (all other operations) See Appendix C	N.E.	Colorless, odorless solid.	MW: ? BP: Decomposes Sol: Insoluble F.L.P.: ? IP: NA Combustible Solid	VP: 0 mm (approx) MLT: Decomposes UEL: ? LEL: ?	Strong oxidizers	Vertical elut; none; Grav; OSHA [1910.1043]
Crag® herbicide C ₈ H ₇ Cl ₂ OCH ₂ CH ₂ OSO ₂ Na 136-78-7 KK4900000	Crag® herbicide No. 1; Sesone; Sodium-2-(2,4-dichlorophenoxy) ethyl sulfate	NIOSH/OSHA 10 mg/m ³ (total) 5 mg/m ³ (resp)	5000 mg/m ³	Colorless to white crystalline, odorless solid. [herbicide]	MW: 309.1 BP: Decomposes Sol(77°F): 26% F.L.P.: NA IP: ? Sp.Gr: 1.70 Noncombustible Solid	VP: 0.1 mm MLT: 473°F (Decomposes) UEL: NA LEL: NA	Strong oxidizers, acids	Filter; Water; Vis; III(5) [#S356]
Cresol (all isomers) CH ₃ C ₆ H ₄ OH 1319-77-3 GO5950000 2076 55	ortho-, meta-, or para-Cresol; Cresylic acid; 2-, 3-, or 4-Methyl phenol	NIOSH 2.3 ppm (10 mg/m ³) OSHA 5 ppm (22 mg/m ³) [skin]	250 ppm	Colorless, yellow, brown, or pinkish, oily liquids or solids with a sweet, tarry odor.	MW: 108.2 BP: 376-397°F Sol: 2% F.L.P.: 178°F(o) 187°F(m) 187°F(p) IP: 8.93 eV(o) 8.98 eV(m) 8.97 eV(p) Sp.Gr(77°F): 1.03	VP(100°F): 1 mm FRZ: 52-95°F UEL: ? LEL(300°F): 1.4(o) 1.1(m) 1.1(p)	Strong oxidizers, acids	Si gel; Acetone; GC/FID; III [#2001]

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH/OSHA 1 mg/m ³ : DMF _u /SA/SCBA 2.5 mg/m ³ : PAPRDMF _u /SA/CF 5 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF/ SAT/CF 200 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Con	Metal fume fever; chills, muscle ache, nau, fever, dry throat, cough, weak, last; irrit eyes, upper resp tract; metallic or sweet taste; discoloration skin, hair	Breath Resp support	Resp sys, skin, eyes, inc risk with Wilson's disease
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH 1 mg/m ³ : D 2 mg/m ³ : DXSQ/SA/HIE/SCBA 5 mg/m ³ : PAPRD/SA/CF 10 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF/ SAT/CF 20 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh	Tight chest, cough, wheez, dysp; decrease FEV; bron; mal; cough, fever, chills, upper resp symptoms after initial exposure	Eye: Breath: Irr immed Fresh air	Resp sys, CVS
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam		NIOSH/OSHA 50 mg/m ³ : DM 100 mg/m ³ : DMXSQ/SA/SCBA 250 mg/m ³ : PAPRDM/SA/CF 500 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIE/SAT/CF* 5000 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	None known	Eye: Skin: Breath: Swallow: Irr immed Water wash prompt Resp support Medical attention immed	None known
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench		NIOSH 23 ppm: CCRQVDM/SA/SCBA 57.5 ppm: SA,CF/PAPROVDM 115 ppm: CCRFOVHIE/SCBAF/SAF/ GMFOVHIE/PAPRTHIE/ SAT/CF* 250 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	CNS effects; cont, depres, resp fail; dysp, irreg rapid resp, weak pulse; skin, eye burns; derm; lung, liver, kidney damage	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medi attention immed	CNS, resp sys, liver, kidneys, skin, eyes

Cresol (all isomers)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Crotonaldehyde CH ₃ CH=CHCHO 123-73-9 (trans-isomer) GP962500 (trans-isomer)	2-Butenal, beta-Methylacrolein, Propylene aldehyde	NIOSH/OSHA 2 ppm (6 mg/m ³)	400 ppm	Water-white liquid with a suffocating odor. [Note: Turns pale-yellow on contact with air.]	MW: 70.1 BP: 219°F Sol: 18% Fl.P: 45°F IP: 9.73 eV	VP: 19 mm FRZ: -101°F UEL: 15.5% LEL: 2.1%	Caustics, ammonia, strong oxidizers, nitric acid, amines [Note: Polymerization may occur at elevated temperatures, such as in fire conditions.]	Bub: none; PLR: I[5] [P&CAM #265]
1143 28 (inhibited)	1 ppm = 2.91 mg/m ³				Sp.Gr: 0.87 Class IA Flammable Liquid			
Cumene C ₉ H ₈ CH(CH ₃) ₂ 98-82-8 GR8575000	Cumol, isopropyl benzene, 2-Phenyl propane	NIOSH/OSHA 50 ppm (245 mg/m ³) [skin]	8000 ppm	Colorless liquid with a sharp, penetrating, aromatic odor.	MW: 120.2 BP: 306°F Sol: Insoluble Fl.P: 96°F IP: 6.75 eV	VP(77°F): 5 mm FRZ: -141°F UEL: 6.5% LEL: 0.9%	Oxidizers	Char; GC/FID; III [#1501, Aromatic Hydro- carbons]
1918 28	1 ppm = 5.00 mg/m ³				Sp.Gr: 0.86 Class IC Flammable Liquid			
Cyanides (as CN) 1: KCN 2: NaCN 1: 151-50-8/TS8750000 2: 143-33-9/VZ7530000 1680 55 (KCN soln) 1689 55 (NaCN)	1: Potassium cyanide, Potassium salt of hydrocyanic acid 2: Sodium cyanide, Sodium salt of hydrocyanic acid Synonyms of other com- pounds vary depending upon the specific com- pound.	NIOSH C 5 mg/m ³ (4.7 ppm) [10-min] OSHA 5 mg/m ³	50 mg/m ³	KCN & NaCN are white granular or crystalline solids with a faint almond-like odor.	MW: 65.1/49.0 BP: 7/2725°F Sol(77°F): 12/58% Fl.P: NA/NA IP: NA/NA	VP: 0/0 mm (approx) MLT: 11/3/ 104°F UEL: NA/NA LEL: NA/NA	Strong oxidizers, such as acids, acid salts, chlorates & nitrates	Filter/Bub; KOH; ISE; III [#7904]
Cyclohexane C ₆ H ₁₂ 110-82-7 GU6300000	Benzene hexahydride, Hexahydrobenzene, Hexamethylene, Hexanaphthene	NIOSH/OSHA 300 ppm (1050 mg/m ³)	10,000 ppm	Colorless liquid with a sweet, chloroform-like odor. [Note: A solid below 44°F.]	MW: 84.2 BP: 177°F Sol: Insoluble Fl.P: 0°F IP: 9.88 eV	VP(77°F): 98 mm FRZ: 44°F UEL: 8% LEL: 1.3%	Oxidizers	Char; CS; GC/FID; III [#1500, Hydro- carbons]
1145 26	1 ppm = 3.50 mg/m ³				Sp.Gr: 0.78 Class IA Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Reason prob Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench	NIOSH/OSHA 20 ppm: CCROV*/SA*/SCBA* 50 ppm: SA,CF*/PAPROV* 100 ppm: CCRFOV/GMFOV/SCBAF/SAF 400 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, resp sys; in animals: dysp, pulm edema, irrit skin	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, eyes, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	NIOSH/OSHA 500 ppm: CCROV*/SA*/SCBA* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA,CF* 2500 ppm: GMFOV/SCBAF/SAF 8000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, muc memb; head; derm; narco, coma	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, upper resp sys, skin, CNS
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 50 mg/m ³ : SA/SCBA §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFSHE/SCBAE	Inh Abs Ing Con	Asphy and death can occur; weak, head, cont; nau, vomit; incr rate resp; slow gasping resp; irrit eyes, skin	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	CVS, CNS, liver, kidneys, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: PAPROV*/CCRFOV 7500 ppm: SA,CF† 10,000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, resp sys; drow; derm; narco, coma	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, resp sys, skin, CNS

Cyclohexane

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr., Flammability	VP, FRZ, UEL, LEL		
Cyclohexanol C ₆ H ₁₁ OH 108-93-0 GV7875000	Anol, Cyclohexyl alcohol, Hexahydrophenol, Hexalin, Hydralin, Hydroxycyclohexane	NIOSH/OSHA 50 ppm (200 mg/m ³) [skin]	3500 ppm	Sticky solid or colorless to light-yellow liquid (above 77°F) with a camphor-like odor.	MW: 100.2 BP: 322°F Sol: 4% FLP: 154°F IP: 10.00 eV	VP: 1 mm MLT: 77°F UEL: ? LEL: ?	Strong oxidizers	Char; 2-Propanol/ CS ₂ ; GC/FID; II [#1402, Alcohols II]
	1 ppm = 4.17 mg/m ³				Sp.Gr: 0.96 Class IIIA Combustible Liquid			
Cyclohexanone C ₆ H ₁₀ O 108-94-1 GW1050000	Cyclohexyl ketone, Pimelic ketone	NIOSH/OSHA 25 ppm (100 mg/m ³) [skin]	5000 ppm	Water-white to pale-yellow liquid with a peppermint- or acetone-like odor.	MW: 98.2 BP: 312°F Sol: 50°F: 15% FLP: 146°F IP: 9.14 eV	VP(77°F): 5 mm FRZ: -49°F UEL: 9.4% LEL(212°F): 1.1%	Oxidizers, nitric acid	Char; CS ₂ ; GC/FID; III [#1300, Ketones I]
	1 ppm = 4.08 mg/m ³				Sp.Gr: 0.95 Class IIIA Combustible Liquid			
Cyclohexene C ₆ H ₁₀ 110-83-8 GW2500000	Benzene tetrahydride, Tetrahydrobenzene	NIOSH/OSHA 300 ppm (1015 mg/m ³)	10,000 ppm	Colorless liquid with a sweet odor.	MW: 82.2 BP: 181°F Sol: Insoluble FLP: 11°F IP: 8.95 eV	VP(100°F): 160 mm FRZ: -154°F UEL ? LEL ?	Strong oxidizers [Note: Forms explosive peroxides with oxygen upon storage.]	Char; CS ₂ ; GC/FID; III [#1500, Hydrocarbons]
	1 ppm = 3.42 mg/m ³				Sp.Gr: 0.81 Class IA Flammable Liquid			
Cyclopentadiene C ₅ H ₆ 542-92-7 GY1000000	1,3-Cyclopentadiene	NIOSH/OSHA 75 ppm (200 mg/m ³)	2000 ppm	Colorless liquid with an irritating, terpene-like odor.	MW: 66.1 BP: 107°F Sol: Insoluble FLP(oc): 77°F IP: 8.56 eV	VP: ? FRZ: -121°F UEL: ? LEL: ?	Strong oxidizers [Note: Polymerizes to dicyclopentadiene upon standing.]	Chrom- 104; Ethyl acetate; GC/FID; III [#2523]
	1 ppm = 2.75 mg/m ³				Sp.Gr: 0.80 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 500 ppm: CCROV/SA/SCBA* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA,CF* 2500 ppm: GMFOV/SCBAF/SAF 3500 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat, skin; narco	Eye: Skin: Breath: Swallow:	Irr immed Water wash prompt Resp support Medical attention immed	Eyes, resp sys, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 625 ppm: SA,CF*/PAPROV* 1000 ppm: CCRFOV 1250 ppm: GMFOV/SCBAF/SAF 5000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, muc memb; head; narco, coma; derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Resp sys, eyes, skin, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: PAPROV*/CCRFOV 7500 ppm: SA,CF* 10,000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, resp sys, skin; drow	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, eyes, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 750 ppm: CCROV/SA/SCBA 1000 ppm: PAPROV/CCRFOV/PAPRTOV 1875 ppm: SA,CF 2000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, resp sys

Cyclopentadiene

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL F.L.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
2,4-D $\text{Cl}_2\text{C}_6\text{H}_3\text{OCH}_2\text{COOH}$ 94-75-7 AG6825000	2,4-Dichlorophenoxyacetic acid; Dichlorophenoxyacetic acid	NIOSH/OSHA 10 mg/m ³	500 mg/m ³	White to yellow crystalline, odorless powder. [herbicide]	MW: 221.0 BP: Decomposes Sol: 0.05% F.L.P: NA IP: ?	VP: Low MLT: 280°F UEL: NA LEL: NA	Strong oxidizers	Filter; Methanol; HPLC/UVD; III [#5001]
2765 55					Sp.Gr(86°F): 1.57 Noncombustible Solid, but may be dissolved in flammable liquids.			
DDT $(\text{C}_6\text{H}_4\text{Cl})_2\text{CHCCl}_3$ 50-29-3 KJ3325000	1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane; p,p'-DDT; Dichlorodiphenyltrichloroethane	NIOSH Ca See Appendix A 0.5 mg/m ³ OSHA 1 mg/m ³ [skin]	Ca [N.E.]	Colorless crystals or off-white powder with a slight aromatic odor. [pesticide]	MW: 354.5 BP: 230°F (Decomposes) Sol: Insoluble F.L.P: 162-171°F IP: ?	VP: Low MLT: 227°F UEL: ? LEL: ?	Strong oxidizers, alkalis	Filter; Isooctane; GC/ECD; II(3) [#S274]
2761 55					Sp.Gr: 0.99 Combustible Solid			
Decaborane $\text{B}_{10}\text{H}_{14}$ 17702-41-9 HD1400000	Boron hydride, Decaboron tetradecahydride	NIOSH/OSHA 0.3 mg/m ³ (0.05 ppm) ST 0.9 mg/m ³ (0.15 ppm) [skin]	100 mg/m ³	Colorless to white crystalline solid with an intense, bitter, chocolate-like odor.	MW: 122.2 BP: 415°F Sol: Slight F.L.P: 176°F IP: 9.88 eV	VP(77°F): 0.05 mm MLT: 211°F UEL: ? LEL: ?	Oxidizers, water, halogenated materials (especially carbon tetrachloride) [Note: May spontaneously ignite on exposure to air. Decomposes slowly in hot water.]	None available
1868 34					Sp.Gr(77°F): 0.94 Combustible Solid			
Demeton $\text{C}_9\text{H}_{19}\text{O}_3\text{PS}_2$ 8065-48-3 TF3150000	O-O-Diethyl-(O and S)-2-(ethylthio)ethyl phosphorothioate mixture, Systox [®]	NIOSH/OSHA 0.1 mg/m ³ [skin]	20 mg/m ³	Amber, oily liquid with a sulfur-like odor. [insecticide]	MW: 258.3 BP: Decomposes Sol: 0.01% F.L.P: 113°F IP: ?	VP: 0.0003 mm FRZ: <13°F UEL: ? LEL: ?	Strong oxidizers, alkalis, water	Filter/ XAD-2; Toluene; GC/FPD; III [#5514]
	1 ppm = 10.74 mg/m ³				Sp.Gr: 1.12 Class II Combustible Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 100 mg/m ³ : CCROVDMFu/SA/SCBA 250 mg/m ³ : PAPROVDMFu/SA,CF 500 mg/m ³ : CCRFOVHIE/GMFOVHIE/PAPRTOVHIE/SCBAF/SAF/SAT,CF g: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Weak, stupor, hyporeflexia, musc twitch; convuls; derm; in animals: liver, kidney damage	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Skin, CNS	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH v: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Paras tongue, lips, face; tremor; appre, dizz, conf, mal, head, flg; convuls; paresis hands; vomit; irrit eyes, skin; [card]	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	CNS, kidneys, liver, skin, PNS	
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam/daily Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 3 mg/m ³ : SA/SCBA 7.5 mg/m ³ : SA,CF 15 mg/m ³ : SCBAF/SAF/SAT,CF 100 mg/m ³ : SCBAF-PD,PP g: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Dizz, head, nau, li-head, drow; inco, local musc spasm, tremor, convuls; flg; in animals: dyp; weak; liver, kidney damage	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	CNS	
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 1 mg/m ³ : SA/SCBA 2.5 mg/m ³ : SA,CF 5 mg/m ³ : SCBAF/SAF/SAT,CF 20 mg/m ³ : SA-PD,PP g: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Miosis, ache eyes, rhin, head; tight chest, wheez, lar spasm, saliv, cyan; anor, nau, vomit, abdom: cramp, diarr; local sweat; musc fasc, weak, para; gidd, conf, ataxia; convuls, coma; low BP; card irregularities; irrit eyes, skin	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, CVS, CNS, skin, eyes, blood chol	

Demeton

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FL.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Diacetone alcohol $\text{CH}_3\text{COCH}_2\text{C}(\text{CH}_3)_2\text{OH}$ 123-42-2 SA9100000	Diacetone, 4-Hydroxy-4-methyl-2-pentanone, 2-Methyl-2-pentanol-4-one	NIOSH/OSHA 50 ppm (240 mg/m ³)	2100 ppm	Colorless liquid with a faint, minty odor.	MW: 116.2 BP: 334°F Sol: Miscible FL.P: 125°F IP: ?	VP: 1 mm FRZ: -47°F UEL: 6.9% LEL: 1.6%	Strong oxidizers, strong alkalis	Char; 2-Propanol/ CS; GCFID; III [#1402, Alcohols III]
1148 26	1 ppm = 4.83 mg/m ³				Sp.Gr: 0.94 Class II Combustible Liquid			
Diazomethane CH_2N_2 334-88-3 PA7000000	Azomethylene, Azomethylene, Diazirine, Diazomethane	NIOSH/OSHA 0.2 ppm (0.4 mg/m ³)	2 ppm	Yellow gas with a musty odor. [Note: Shipped as a liquefied compressed gas.]	MW: 42.1 BP: -9°F Sol: Reacts FL.P: NA (Gas) IP: 9.00 eV	VP: >1 atm FRZ: -229°F UEL: ? LEL: ?	Alkali metals, water, drying agents such as calcium arsenate [Note: May explode violently on heating, exposure to sunlight, or contact with rough edges such as ground glass.]	XAD-2*; CS; GCFID; III [#2515]
	1 ppm = 1.75 mg/m ³				Flammable Gas [EXPLOSIVE!]			
Diborane B_2H_4 19287-45-7 HQ9275000	Boroethane, Boron hydride, Diboron hexahydride	NIOSH/OSHA 0.1 ppm (0.1 mg/m ³)	40 ppm	Colorless gas with a repulsive, sweet odor. [Note: Usually shipped in pressurized cylinders.]	MW: 27.7 BP: -135°F Sol: Reacts FL.P: NA (Gas) IP: 11.38 eV	VP: >1 atm FRZ: -265°F UEL: 86% LEL: 0.8%	Water, halogenated compounds, aluminum, lithium, oxidized surfaces, acids [Note: Will ignite spontaneously in moist air at room temperature. Reacts with water to form hydrogen & boric acid.]	Filter/ Char*; H_2O_2 ; PES; III [#6006]
1911 18	1 ppm = 1.15 mg/m ³				Flammable Gas			
1,2-Dibromo-3-chloro-propane $\text{CH}_2\text{BrCHBrCH}_2\text{Cl}$ 96-12-8 TX8750000	1-Chloro-2,3-dibromo-propane; DBCP; Dibromochloropropane	NIOSH Ca See Appendix A OSHA [1910.1044] 0.001 ppm	Ca	Dense yellow or amber liquid with a pungent odor at high concentrations. [Note: A solid below 43°F.] [pesticide]	MW: 236.4 BP: 384°F Sol(70°F): 0.1% FL.P(oc): 170°F IP: ?	VP: 0.8 mm FRZ: 43°F UEL: ? LEL: ?	Chemically active metals such as aluminum, magnesium & tin alloys [Note: Corrosive to metals.]	None available
2872 58	1 ppm = 9.83 mg/m ³				Sp.Gr: 2.05 Class IIIA Combustible Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Repeat	NIOSH/OSHA 1000 ppm: CCRFOV/PAPROV ⁶ 1250 ppm: SA/CF ⁴ 2100 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh	Irrit eyes, nose, throat, skin; corneal tissue damage; narco	Eye:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin, resp sys
Goggles:	Reason prob		Ing		Skin:		
Wash:	Prompt wet		Con		Breath:		
Change:	N.R.				Swallow:		
Remove:	Prompt non-imperv wet						
Clothing:	Prevent contam or freezing	NIOSH/OSHA 2 ppm: SA/SCBA* §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh	Cough, short breath; head; flush skin, fever; chest pain, pulm edema, pneumis; irrit eyes, asthma; flg	Eye:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, eyes, skin
Goggles:	Any poss		Ing		Skin:		
Wash:	Prompt contam		Con		Breath:		
Change:	N.R.				Swallow:		
Remove:	Immed wet (flamm)						
Provide:	Eyewash						
Clothing:	N.R.	NIOSH/OSHA 1 ppm: SA/SCBA 2.5 ppm: SA/CF §: SCBAF/SAF/SAT/CF 40 ppm: SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh	Tight chest, precordial pain, short breath, non- productive cough, nau; head, li-head, vari, chills, fever, flg, weak, tremor, musc fasc; in animals: liver, kidney damage; pulm edema; hemorr	Eye:	Irr immed Resp support	Resp sys, CNS
Goggles:	N.R.		Con		Breath:		
Wash:	N.R.						
Change:	N.R.						
Remove:	N.R.						
Clothing:	Any poss	NIOSH §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh	Drow; nau, vomit; irrit eyes, nose, throat, skin; pulm edema, [carc]	Eye:	Irr immed Soap wash immed Resp support Medical attention immed	CNS, skin, liver, kidneys, spleen, reproductive sys, digestive sys
Goggles:	Any poss		Abs		Skin:		
Wash:	Immed contam/ideal		Con		Breath:		
Change:	After work if any poss contam				Swallow:		
Remove:	Immed contam						

Chemical name, structure formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl, P, IP, Sp, Gr, flammability	VP, FRZ UEL, LEL		
Dibutyl phosphate (C ₄ H ₉ O) ₂ (OH)PO 107-66-4 TB9605000	Dibutyl acid o-phosphate, di-n-Butyl hydrogen phosphate, Dibutyl phosphoric acid	NIOSH/OSHA 1 ppm (5 mg/m ³) ST 2 ppm (10 mg/m ³)	125 ppm	Pale amber, odorless liquid.	MW: 210.2 BP: 212°F (Decomposes) Sol: Insoluble Fl.P.: ? IP: ?	VP: 1 mm (approx) FRZ: ? UEL: ? LEL: ?	Strong oxidizers	Filter: CH ₃ CN; GC/FPD; III [#5017]
	1 ppm = 8.74 mg/m ³				Sp.Gr: 1.06 Combustible Liquid			
Dibutylphthalate C ₈ H ₁₆ (COOC ₄ H ₉) ₂ 84-74-2 TI0875000	DBP; Dibutyl 1,2-benzene- dicarboxylate; Di-n-butyl phthalate	NIOSH/OSHA 5 mg/m ³	9300 mg/m ³	Colorless to faint yellow, oily liquid with a slight, aromatic odor.	MW: 278.3 BP: 644°F Sol(77°F): 0.5% Fl.P.: 315°F IP: ?	VP: <0.01 mm FRZ: -31°F UEL: ? LEL(456°F): 0.5%	Nitrates; strong oxidizers, alkalis & acids; liquid chlorine	Filter: CS ₂ ; GC/FID; III [#5020]
	1 ppm = 11.57 mg/m ³				Sp.Gr: 1.05 Class IIIB Combustible Liquid			
o-Dichlorobenzene C ₆ H ₄ Cl ₂ 95-50-1 CZ4500000	o-DCB; 1,2-Dichlorobenzene; ortho-Dichlorobenzene; o-Dichlorobenzol	NIOSH/OSHA C 50 ppm (300 mg/m ³)	1000 ppm	Colorless to pale- yellow liquid with a pleasant, aromatic odor. [herbicide]	MW: 147.0 BP: 357°F Sol: 0.01% Fl.P.: 151°F IP: 9.06 eV	VP: 1 mm FRZ: 1°F UEL: 9.2% LEL: 2.2%	Strong oxidizers, aluminum, acids, acid fumes, chlorides	Char: CS ₂ ; GC/FID; III [#1003, Haloge- nated Hydro- carbons]
1591 58	1 ppm = 6.11 mg/m ³				Sp.Gr: 1.30 Class IIIA Combustible Liquid			
p-Dichlorobenzene C ₆ H ₄ Cl ₂ 106-46-7 CZ4550000	p-DCB; 1,4-Dichlorobenzene; para-Dichlorobenzene; Dichloroide	NIOSH Ca See Appendix A OSHA 75 ppm (450 mg/m ³) ST 110 ppm (675 mg/m ³)	Ca [1000 ppm]	Colorless or white crystalline solid with a mothball- like odor. [insecticide]	MW: 147.0 BP: 345°F Sol: 0.008% Fl.P.: 150°F IP: 8.98 eV	VP(77°F): 0.4 mm MLT: 128°F UEL: ? LEL: ?	Oxidizers	Char: CS ₂ ; GC/FID; III [#1003, Haloge- nated Hydro- carbons]
1592 58					Sp.Gr: 1.25 Combustible Solid, but may take some effort to ignite.			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Reason prob Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam Provide: Quick drench		NIOSH/OSHA 10 ppm: SA/SCBA 25 ppm: SA/CF 50 ppm: SCBAF/SAF/SAT/CF 125 ppm: SA-PD/PP §: SCBAF-PD/PP/SAF-PD/PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Ing Con	Irrit resp sys, skin; head	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin
Clothing: N.R. Goggles: Reason prob Wash: N.R. Change: N.R. Remove: N.R.		NIOSH/OSHA 50 mg/m ³ : DMF 125 mg/m ³ : PAPRDM ² /SA/CF ¹ 250 mg/m ³ : HIEF/SCBAF/SAF 9300 mg/m ³ : SAF-PD/PP §: SCBAF-PD/PP/SAF-PD/PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit upper resp tract, stomach	Eye: Skin: Breath: Swallow: Irr immed Wash regularly Resp support Medical attention immed	Resp sys, GI tract
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam		NIOSH/OSHA 1000 ppm: PAPROV ⁵ /CCRFOV §: SCBAF-PD/PP/SAF-PD/PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit nose, eyes; liver, kidney damage; skin blister	Eye: Skin: Breath: Swallow: Irr immed Wash promptly Resp support Medical attention immed	Liver, kidneys, skin, eyes
Clothing: Repeat Goggles: Reason prob Wash: Daily (reason prob) Change: N.R. Remove: N.R.		NIOSH v: SCBAF-PD/PP/SAF-PD/PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Head, eye irrit, swell periorb; profuse rhinitis; anor, nau, vomit; low-wgt, jaun, cirr; [canc] in animals: liver, kidney damage	Eye: Skin: Breath: Swallow: Irr immed Soap wash Resp support Medical attention immed	Liver, resp sys, eyes, kidneys, skin

p-Dichlorobenzene

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL, P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
3,3'-Dichlorobenzidine (and its salts) $C_6H_4ClNHC_6H_4ClNH_2$ 91-94-1 DD0525000	4,4'-Diamino-3,3'-dichloro-biphenyl; Dichlorobenzidine base; o,o'-Dichlorobenzidine; 3,3'-Dichlorobiphenyl-4,4'-diamine; 3,3'-Dichloro-4,4'-biphenyl-diamine; 3,3'-Dichloro-4,4'-diamino-biphenyl	NIOSH Ca See Appendix A OSHA [1910.1007] See Appendix B ACGIH A2 [skin]	Ca	Gray to purple crystalline solid.	MW: 253.1 BP: 788°F Sol: Almost Insoluble FLP: ? IP: ?	VP: ? MLT: 271°F UEL: ? LEL: ?	None reported	Filter/ Si gel; Reagent; HPLC/UV/D; III #5509
Dichlorodifluoromethane CCl_2F_2 75-71-8 PA8200000	Difluorodichloromethane, Fluorocarbon 12, Freon® 12, Halon® 122, Propellant 12, Refrigerant 12	NIOSH/OSHA 1000 ppm (4950 mg/m ³)	50,000 ppm	Colorless gas with an ether-like odor at extremely high concentrations. [Note: Shipped as a liquefied compressed gas.]	MW: 120.9 BP: -22°F Sol(77°F): 0.03% FLP: NA IP: 11.75 eV	VP: >1 atm FRZ: -252°F UEL: NA LEL: NA	Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium	Char(2); CH_2Cl_2 ; GC/FID; III #1018
1028 12	1 ppm = 5.03 mg/m ³				Nonflammable Gas			
1,3-Dichloro-5,5-dimethylhydantoin $C_8H_{14}Cl_2N_2O_2$ 118-52-5 MU0700000	Dactin, DDH, Halane	NIOSH/OSHA 0.2 mg/m ³ ST 0.4 mg/m ³	Unknown	White powder with a chlorine-like odor.	MW: 197.0 BP: ? Sol: 0.2% FLP: 346°F IP: ?	VP: ? MLT: 270°F UEL: ? LEL: ?	Water, strong acids, easily oxidized materials such as ammonia salts & sulfides	None available
					Sp.Gr: 1.5 Combustible Solid			
1,1-Dichloroethane $CHCl_2CH_3$ 75-34-3 KI0175000	Asymmetrical dichloroethane; Ethylidene chloride; 1,1-Ethylidene dichloride	NIOSH/OSHA 100 ppm (400 mg/m ³)	4000 ppm	Colorless, oily liquid with a chloroform-like odor.	MW: 99.0 BP: 135°F Sol: 0.6% FLP(oc): 22°F IP: 11.06 eV	VP(77°F): 230 mm FRZ: -143°F UEL: ? LEL: 5.6%	Strong oxidizers, strong caustics	Char; CS_2 ; GC/FID; III #1003, Halogenated Hydrocarbons
2362 27	1 ppm = 4.12 mg/m ³				Sp.Gr: 1.18 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Immed contam/daily Wash: After work if any poss Change: contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH ¶: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Allergic skin reaction, sens, derm; head, dizz; caustic burns; frequent urination, dysuria; hema; GI upset; upper resp infection; [card]	Eye: Irr immed (15 min) Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Bladder, liver, lung, skin, GI tract
Clothing: Prevent wet or freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 10,000 ppm: SA/SCBA 25,000 ppm: SA/CF 50,000 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Con	Dizz, tremors, unconsciousness, card arrhy, card arrest	Eye: Irr immed Skin: Water flush immed Breath: Resp support	CVS, PNS
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: After work if reason Remove: Prompt non-imperv Provide: Eyewash	NIOSH/OSHA 2 mg/m ³ : SA/SCBA 5 mg/m ³ : SA/CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFSHIE/SCBAE	Inh Ing Con	Irrit eyes, muc memb, resp sys	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes
Clothing: Repeat Goggles: Reason prob Wash: Immed wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: SA/SCBA 2500 ppm: SA/CF 4000 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	CNS depres; skin irrit; liver, kidney damage	Eye: Irr immed Skin: Soap flush prompt Breath: Resp support Swallow: Medical attention immed	Skin, liver, kidneys

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
1,2-Dichloroethylene CICH=CHCl 540-59-0 KV9360000	Acetylene dichloride, cis-Acetylene dichloride, trans-Acetylene dichloride, sym-Dichloroethylene	NIOSH/OSHA 200 ppm (790 mg/m ³)	4000 ppm	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.	MW: 97.0 BP: 118-140°F Sol: 0.4% Fl.P: 36°F IP: 9.65 eV	VP: 180-264 mm FRZ: -57 to -115°F UEL: 12.8% LEL: 5.6%	Strong oxidizers, strong alkalis, potassium hydroxide, copper	Char; CS ₂ ; GC/FID; III [#1003, Halo- genated Hydro- carbons]
1150 29	1 ppm = 4.03 mg/m ³				Sp.Gr(77°F): 1.27 Class IB Flammable Liquid			
Dichloroethyl ether (CICH ₂ CH ₂) ₂ O 111-44-4 KN0875000	bis(2-Chloroethyl)ether; 2,2'-Dichlorodiethyl ether	NIOSH Ca See Appendix A 5 ppm (30 mg/m ³) ST 10 ppm (60 mg/m ³) [skin] OSHA 5 ppm (30 mg/m ³) ST 10 ppm (60 mg/m ³) [skin]	Ca [250 ppm]	Colorless liquid with a chlorinated solvent-like odor.	MW: 143.0 BP: 352°F Sol: 1% Fl.P: 131°F IP: ?	VP: 0.7 mm FRZ: -58°F UEL: ? LEL: 2.7%	Strong oxidizers [Note: Decomposes in presence of moisture to form hydrochloric acid.]	Char; CS ₂ ; GC/FID; III [#1004]
1916 57	1 ppm = 5.94 mg/m ³				Sp.Gr: 1.22 Class IIIA Combustible Liquid			
Dichloromonofluoro- methane CHCl ₂ F 75-43-4 PAB400000	Dichlorofluoromethane, Fluorodichloromethane, Freon® 21, Halon® 112, Refrigerant 21	NIOSH/OSHA 10 ppm (40 mg/m ³)	50,000 ppm	Colorless gas with a slight, ether- like odor. [Note: A liquid below 48°F. Shipped as a liquefied compressed gas.]	MW: 102.9 BP: 48°F Sol(86°F): 0.7% Fl.P: NA IP: 12.39 eV	VP: >1 atm FRZ: -211°F UEL: NA LEL: NA	Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; acid; acid fumes	Char(2); CS ₂ ; GC/FID; III [#2516]
1029 12	1 ppm = 4.28 mg/m ³				Nonflammable Gas			
1,1-Dichloro-1-nitro- ethane CH ₂ CCl ₂ NO ₂ 594-72-9 KI1050000	Dichloronitroethane	NIOSH/OSHA 2 ppm (10 mg/m ³)	150 ppm	Colorless liquid with an unpleasant odor. [Irritant]	MW: 143.9 BP: 255°F Sol: 0.3% Fl.P: 136°F IP: ?	VP: 15 mm FRZ: ? UEL: ? LEL: ?	Strong oxidizers [Note: Corrosive to iron in presence of moisture.]	Char(pet); CS ₂ ; GC/FID; III [#1601]
2650 57	1 ppm = 5.98 mg/m ³				Sp.Gr: 1.43 Class II Combustible Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: PAPROV/CCRFOV 4000 ppm: SA,CF/GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, resp sys; CNS depres	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, eyes, CNS
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench	NIOSH v: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Lac; irrit nose, throat, cough; nau, vomit; [card]; in animals: pulm irrit, edema; liver damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Any poss wet Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet	NIOSH/OSHA 100 ppm: SA/SCBA 250 ppm: SA,CF 500 ppm: SCBAF/SAF 10,000 ppm: SA,PD,PP 20,000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Asphy, card arrhy, card arrest	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, CVS
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 20 ppm: SA/SCBA 50 ppm: SA,CF 100 ppm: SCBAF/SAF 150 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	In animals: irrit eyes, skin; liver, heart, kidney damage; pulm edema, hemorr	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Lungs

1,1-Dichloro-1-nitroethane

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Dichlorotetrafluoroethane CCl_2CF_2 76-14-2 K1101000	1,2-Dichlorotetrafluoroethane; Freon® 114; Halon® 242; Refrigerant 114	NIOSH/OSHA 1000 ppm (7000 mg/m ³)	50,000 ppm	Colorless gas with a faint, ether-like odor at high concentrations. [Note: A liquid below 38°F. Shipped as a liquefied compressed gas.]	MW: 170.9 BP: 38°F Sol: 0.01% Fl.P: NA IP: 12.20 eV	VP: >1 atm FRZ: -137°F UEL: NA LEL: NA	Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc and magnesium; acids; acid fumes	Char(2); CH_2Cl_2 ; GC/FID; III [#1018]
1958 12	1 ppm = 7.10 mg/m ³				Nonflammable Gas			
Dichlorvos $(\text{CH}_3\text{O})_2\text{P}(\text{O})\text{OCH}=\text{CCl}_2$ 62-73-7 TC0350000	DDVP; 2,2-Dichlorovinyl dimethyl phosphate	NIOSH/OSHA 1 mg/m ³ [skin]	200 mg/m ³	Colorless to amber liquid with a mild, chemical odor. [Note: Insecticide that may be absorbed on a dry carrier.]	MW: 221.0 BP: Decomposes Sol: 0.5% Fl.P(oc): >175°F IP: ?	VP(86°F): 0.01 mm FRZ: ? UEL: ? LEL: ?	Strong acids, strong alkalis [Note: Corrosive to iron & mild steel.]	XAD-2; Toluene; GC/FPD; II(5) [P&CAM #295]
2783 55	1 ppm = 9.19 mg/m ³				Sp.Gr(77°F): 1.42 Class III Combustible Liquid			
Dieldrin $\text{C}_{12}\text{H}_8\text{Cl}_4\text{O}$ 60-57-1 IO1750000	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo-exo-5,8-dimethanonaphthalene; HEOD	NIOSH Ca See Appendix A 0.25 mg/m ³ [skin] OSHA 0.25 mg/m ³ [skin]	Ca [450 mg/m ³]	Colorless to light tan crystals with a mild, chemical odor. [insecticide]	MW: 380.9 BP: Decomposes Sol: 0.02% Fl.P: NA IP: ?	VP: Low MLT: 349°F UEL: NA LEL: NA	Strong oxidizers, active metals such as sodium, strong acids, phenols	Filter; Isocetane; GC/ECD; II(3) [#S283]
2761 55					Sp.Gr: 1.75 Noncombustible Solid			
Diethylamine $(\text{C}_2\text{H}_5)_2\text{NH}$ 109-89-7 HZ6750000	Diethylamine; N,N-Diethylamine; N-Ethylethanamine	NIOSH/OSHA 10 ppm (30 mg/m ³) ST 25 ppm (75 mg/m ³)	2000 ppm	Colorless liquid with a fishy, ammonia-like odor.	MW: 73.1 BP: 132°F Sol: Miscible Fl.P: -15°F IP: 8.01 eV	VP: 192 mm FRZ: -58°F UEL: 10.1% LEL: 1.8%	Strong oxidizers, strong acids, cellulose nitrate	Si gel; H_2SO_4 / Methanol; GC/FID; III [#2010]
1154 68	1 ppm = 3.04 mg/m ³				Sp.Gr: 0.71 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss wet Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet		NIOSH/OSHA 10,000 ppm: SA/SCBA 25,000 ppm: SA,CF 50,000 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit resp sys; asphy; card arrhy, card arrest	Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed	Resp sys, CVS
Clothing: Repeat Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam		NIOSH/OSHA 10 mg/m ³ : SA/SCBA 25 mg/m ³ : SA,CF 50 mg/m ³ : SCBAF/SAF/SAT,CF 200 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHE/SCBAE	Inh Abs Ing Con	Miosis, ache eyes; rhin; head; tight chest, wheez, lar spasm, saliv; cyan; anor, nau, vomit, diarr; sweat; musc fasc, para, gidd, ataxia; convuls; low BP, card irregularities; irrit skin, eyes	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, CVS, CNS, eyes, skin, blood chol
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench		NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHE/SCBAE	Inh Abs Ing Con	Head, dizz; nau, vomit, mal, sweat; myoclonic limb jerks; clonic, tonic convuls; coma; [carc]; in animals: liver, kidney damage	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	CNS, liver, kidneys, skin
Clothing: Any poss liq Goggles: Any poss >0.5%/ Reason prob 0.5% Wash: Immed contam liq Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash (>0.5%)/ Quick drench (liq)		NIOSH/OSHA 250 ppm: SA,CF [†] /PAPRS [†] 500 ppm: GMFS/SCBAF/SAF/CCRFS 2000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Eye, skin, resp sys irrit	Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed	Resp sys, skin, eyes

Diethylamine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
2-Diethylaminoethanol (C ₂ H ₅) ₂ NCH ₂ CH ₂ OH 100-37-8 KK5075000	Diethylaminoethanol; 2-Diethylaminoethyl alcohol; N,N-Diethylethanolamine; Diethyl-(2-hydroxyethyl)- amine; 2-Hydroxytriethylamine	NIOSH/OSHA 10 ppm (50 mg/m ³) [skin]	500 ppm	Colorless liquid with a nauseating, ammonia-like odor.	MW: 117.2 BP: 325°F Sol: Miscible FLP: 126°F IP: ?	VP: 21 mm FRZ: -94°F UEL: ? LEL: ?	Strong oxidizers, strong acids	Si gel; Methanol; GC/FID; III [#2007, Amino- ethanol Com- pounds]
2686 29	1 ppm = 4.87 mg/m ³				Sp.Gr: 0.89 Class II Combustible Liquid			
Difluorodibromomethane CBr ₂ F ₂ 75-61-6 PA7525000	Dibromodifluoromethane, Freon® 12B2, Halon® 1202	NIOSH/OSHA 100 ppm (860 mg/m ³)	2500 ppm	Colorless, heavy liquid or gas (above 76°F) with a characteristic odor.	MW: 209.8 BP: 76°F Sol: Insoluble FLP: NA IP: 11.07 eV	VP: 620 mm FRZ: -231°F UEL: NA LEL: NA	Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium	Char(2); 2-Propanol; GC/FID; III [#1012]
1941 58	1 ppm = 8.72 mg/m ³				Sp.Gr(59°F): 2.29 Nonflammable Liquid			
Diglycidyl ether C ₄ H ₆ O ₃ 2238-07-5 KN2350000	Diallyl ether dioxide; DGE; 2-Epoxypropyl ether; bis (2,3-Epoxypropyl) ether; di(2,3-Epoxypropyl) ether	NIOSH Ca See Appendix A 0.1 ppm (0.5 mg/m ³) OSHA 0.1 ppm (0.5 mg/m ³)	Ca [25 ppm]	Colorless liquid with a strong, irritating odor.	MW: 130.2 BP: 500°F Sol: ? FLP: 147°F IP: ?	VP(77°F): 0.09 mm FRZ: ? UEL: ? LEL: ?	Strong oxidizers	None available
	1 ppm = 5.41 mg/m ³				Sp.Gr(77°F): 1.26 Class IIIA Combustible Liquid			
Diisobutyl ketone ((CH ₃) ₂ CHCH ₂) ₂ CO 108-83-8 MJ5775000	DiBK; sym-Diisopropyl acetone; 2,6-Dimethyl-4-heptanone; isovalerone; Valerone	NIOSH/OSHA 25 ppm (150 mg/m ³)	2000 ppm	Colorless liquid with a mild, sweet odor.	MW: 142.3 BP: 334°F Sol: 0.05% FLP: 120°F IP: ?	VP: 2 mm FRZ: -43°F UEL(200°F): 7.1% LEL(200°F): 0.8%	Strong oxidizers	Char; CS ₂ ; GC/FID; III [#1300, Ketones I]
1157 26	1 ppm = 5.92 mg/m ³				Sp.Gr: 0.81 Class II Combustible Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Reason prob Goggles: Any poss >5%/Reason prob <5% Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash (>5%), quick drench	NIOSH/OSHA 100 ppm: CCRFOV ⁴ /SA ⁴ /SCBA ⁴ 250 ppm: SA,CF ¹ /PAPROV ⁴ 500 ppm: CCRFOV/PAPRTOV ⁴ /GMFOV/ SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Nau, vomit; irrit resp sys, skin, eyes	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Repeat Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Prompt non-imperv wet	NIOSH/OSHA 1000 ppm: SA/SCBA 2500 ppm: SA,CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	In animals: irrit resp sys; CNS symptoms; liver damage	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys
Clothing: Any poss Goggles: Reason prob Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Quick drench	NIOSH †: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, resp sys; skin burns; [carc]; in animals: hemato sys, lung, liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Skin, eyes, resp sys
Clothing: Repeat Goggles: N.R. Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 625 ppm: SA,CF ¹ /PAPROV ⁴ 1000 ppm: CCRFOV 1250 ppm: GMFOV/SCBAF/SAF 2000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; head, dizz; derm	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin, eyes

Diisobutyl ketone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Diisopropylamine ((CH ₃) ₂ CH) ₂ NH 108-18-9 IM4025000	N-(1-Methylethyl)-2-propanamine	NIOSH/OSHA 5 ppm (20 mg/m ³) [skin]	1000 ppm	Colorless liquid with an ammonia- or fish-like odor.	MW: 101.2 BP: 183°F Sol: Slight Fl.P: 20°F IP: 7.73 eV	VP: 70 mm FRZ: -141°F UEL: 7.1% LEL: 1.1%	Strong oxidizers, strong acids	Imp; KOH; GC/FID; II(4) [#S141]
1158 68	1 ppm = 4.21 mg/m ³				Sp.Gr: 0.72 Class IB Flammable Liquid			
Dimethyl acetamide CH ₃ CON(CH ₃) ₂ 127-19-5 AB7700000	N,N-Dimethyl acetamide; DMAC	NIOSH/OSHA 10 ppm (35 mg/m ³) [skin]	400 ppm	Colorless liquid with a weak ammonia- or fish-like odor.	MW: 87.1 BP: 329°F Sol: Miscible Fl.P(oc): 158°F IP: 6.81 eV	VP: 2 mm FRZ: -4°F UEL(32°F): 11.5% LEL(212°F): 1.8%	Carbon tetrachloride, other halogenated compounds when in contact with iron	Si gel; Methanol; GC/FID; III [#2004]
	1 ppm = 3.62 mg/m ³				Sp.Gr: 0.94 Class IIIA Combustible Liquid			
Dimethylamine (CH ₃) ₂ NH 124-40-3 IP8750000	Dimethylamine (anhydrous), N-Methylmethanamine	NIOSH/OSHA 10 ppm (18 mg/m ³)	2000 ppm	Colorless gas with an ammonia- or fish-like odor. [Note: A liquid below 44°F. Shipped as a liquefied compressed gas.]	MW: 45.1 BP: 44°F Sol(140°F): 24% Fl.P: NA (Gas) 20°F(Liquid) IP: 8.24 eV	VP: >1 atm FRZ: -134°F UEL: 14.4% LEL: 2.8%	Strong oxidizers, chlorine, mercury, acrolein, fluoride, maleic anhydride	Si gel; H ₂ SO ₄ ; Methanol; GC/FID; III [#2010]
1032 19	1 ppm = 1.87 mg/m ³				Sp.Gr: 0.67 (Liquid at 44°F) Class IA Flammable Liquid			
4-Dimethylaminoazobenzene C ₆ H ₅ NNC(CH ₃) ₂ N(CH ₃) ₂ 60-11-7 BX7350000	Butter yellow; DAB; p-Dimethylaminoazobenzene; N,N-Dimethyl-4-aminoazobenzene; Methyl yellow	NIOSH Ca See Appendix A OSHA [1910.1015] See Appendix B	Ca	Yellow, leaf-shaped crystals.	MW: 225.3 BP: Sublimes Sol: Insoluble Fl.P: ? IP: ?	VP: ? MLT: 237°F UEL: ? LEL: ?	None reported	G-chrom P; 2-Propanol; GC/FID; III(4) [P&CAM #264]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection -- maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Any poss (soin >5%) Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash (<3%)	NIOSH/OSHA 125 ppm: SA,CF ¹ /PA/PROV ⁴ 250 ppm: CCRFOV/GMFOV/SCBAF/SAF 1000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Ing Abs Ing Con	Nau, vomit; head; eye irrit, vis dist; pulm irrit	Eye: Irr immed Skin: Water wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, eyes
Clothing: Any poss Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench	NIOSH/OSHA 100 ppm: SA/SCBA 250 ppm: SA,CF 400 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Jaun, liver damage; depres, lethargy, halu, delusions, irrit skin	Eye: Irr immed Skin: Water flush immed Swallow: Medical attention immed	Liver, skin
Clothing: Any poss liq/Repeat Goggles: Any poss Wash: Immed contam liq/ Prompt contam soin Change: N.R. Remove: Immed wet (flamm) Provide: Liq: Eyewash, quick drench	NIOSH/OSHA 250 ppm: SA,CF ¹ 500 ppm: SCBAF/SAF 2000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Irrit nose, throat; sneezing, cough, dysp; pulm edema; conj; burns skin, muc memb, derm	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, eyes
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Enlarged liver; hepatic and renal dysfunction; contact dermat; cough, wheez, difficulty breath; bloody sputum; bronchial secretions; frequent urination, hema, dysuria; [canc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Liver, skin, bladder

4-Dimethylaminoazobenzene

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp-Gr, flammability	VP, FRZ, UEL, LEL		
Dimethylaniline $C_6H_5N(CH_3)_2$ 121-69-7 BX4725000	N,N-Dimethylaniline; N,N-Dimethylbenzylamine; N,N-Dimethylphenylamine	NIOSH/OSHA 5 ppm (25 mg/m ³) ST 10 ppm (50 mg/m ³) [skin]	100 ppm	Pale yellow, oily liquid with an amine-like odor. [Note: A solid below 36°F.]	MW: 121.2 BP: 378°F Sol: 2% FLP: 142°F IP: 7.14 eV	VP(85°F): 1 mm FRZ: 36°F UEL: 7 LEL: 7	Strong oxidizers, strong acids, benzoyl peroxide	Si gel; Ethanol; GC/FID; III [#2002, Aromatic Amines]
2253 57	1 ppm = 5.04 mg/m ³				Sp.Gr: 0.96 Class IIIA Combustible Liquid			
Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphate $C_2H_2O_4PBr_2Cl_2$ 300-76-5 T89450000	Dibrom; 1,2-Dibromo-2,2-dichloroethyl dimethyl phosphate; Naled [[C ₂ H ₂ O ₄] ₂ (P)(O)OC(Br)-HCBr(C ₂)]	NIOSH/OSHA 3 mg/m ³ [skin]	1800 mg/m ³	Colorless to white solid or straw-colored liquid (above 80°F) with a slightly pungent odor.	MW: 380.8 BP: Decomposes Sol: Insoluble FLP: NA IP: 7	VP: 0.0002 mm MLT: 80°F UEL: NA LEL: NA	Strong oxidizers, acids [Note: Corrosive to metals.]	None available
2783 55	1 ppm = 15.83 mg/m ³				Sp.Gr(77°F): 1.96 Noncombustible Solid			
Dimethylformamide $HC(O)N(CH_3)_2$ 66-12-2 LQ2100000	Dimethyl formamide; N,N-Dimethylformamide; DMF	NIOSH/OSHA 10 ppm (30 mg/m ³) [skin]	3500 ppm	Colorless to pale-yellow liquid with a faint, amine-like odor.	MW: 73.1 BP: 307°F Sol: Miscible FLP: 136°F IP: 9.12 eV	VP(77°F): 4 mm FRZ: -78°F UEL: 15.2% LEL(21°F): 2.2%	Carbon tetrachloride, other halogenated compounds when in contact with iron; strong oxidizers; alkyl aluminums; inorganic nitrates	Si gel; Methanol; GC/FID; III [#2004]
2265 26	1 ppm = 3.04 mg/m ³				Sp.Gr: 0.95 Class IIIA Combustible Liquid			
1,1-Dimethylhydrazine $(CH_3)_2NNH_2$ 57-14-7 MV2450000	Dimazine, DMH, UDMH, Unsymmetrical dimethylhydrazine	NIOSH Ca See Appendix A C 0.06 ppm (0.15 mg/m ³) [2-hr] OSHA 0.5 ppm (1 mg/m ³) [skin]	Ca [50 ppm]	Colorless liquid with an ammonia- or fish-like odor.	MW: 73.1 BP: 147°F Sol: Miscible FLP: 5°F IP: 8.06 eV	VP(77°F): 157 mm FRZ: -72°F UEL: 95% LEL: 2%	Oxidizers, halogens, metallic mercury, fuming nitric acid, hydrogen peroxide [Note: May ignite SPONTANEOUSLY in contact with oxidizers.]	Bub; Reagent; Vis; IIC3 [#5143]
1163 28	1 ppm = 2.50 mg/m ³		ACGIH A2		Sp.Gr: 0.79 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection – maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench		NIOSH/OSHA 50 ppm: SA/SCBA 100 ppm: SA/CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Anoxia symptoms: cyan, weak, dizz, ataxia	Eye: Skin: Breath: Swallow:	Irr immed Resp support Medical attention immed	Blood, kidneys, liver, CVS
Clothing: Reason prob Goggles: Any poss Wash: Immed contam Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Eyewash		NIOSH/OSHA 30 mg/m ³ : DMFu/SA/HIE/SCBA 75 mg/m ³ : PAPRDMFu/SA/CF 150 mg/m ³ : HIE/PAPRTHIE/SAT/CF/SCBAF/SAF 1800 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: HIE/SCBAE	Inh Abs Ing Con	Miosis, lac; head: tight chest, wheez, lar spasm; saliv; cyan; anor, nau, vomit, abdom cramp, diarr; weak, twitch, para; gdd, ataxia, convuls; low BP; card irregularities; irrit skin, eyes	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, CNS, CVS, skin, eyes, blood chol
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam		NIOSH/OSHA 100 ppm: SA*/SCBA* 250 ppm: SA/CF* 500 ppm: SCBAF/SAF/SAT/CF* 3500 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Nau, vomit, colic; liver damage, hepatomegaly; high BP; face flush; derm; in animals: kidney, heart damage	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Liver, kidneys, CVS, skin
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench		NIOSH §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Irrit eyes, skin; choking, chest pain, dyp; lethargy; nau; anoxia; convuls; liver inj; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	CNS, liver, GI tract, blood, resp sys., eyes, skin

1.1-Dimethylhydrazine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IR, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Dimethylphthalate $C_6H_4(COOCH_2)_2$ 131-11-3 T11575000	Dimethyl ester of 1,2-benzenedicarboxylic acid; DMP	NIOSH/OSHA 5 mg/m ³	9300 mg/m ³	Colorless, oily liquid with a slight, aromatic odor. [Note: A solid below 42°F.]	MW: 194.2 BP: 543°F Sol: 0.4% Fl.P: 295°F IP: 9.64 eV	VP: 0.01 mm FRZ: 42°F UEL: ? LEL(358°F): 0.9%	Nitrates; strong oxidizers, alkalis & acids	None available
	1 ppm = 8.07 mg/m ³				Sp.Gr: 1.19 Class III B Combustible Liquid			
Dimethyl sulfate $(CH_3)_2SO_4$ 77-78-1 WS6225000	Dimethyl ester of sulfuric acid; Dimethylsulfate, Methyl sulfate	NIOSH Ca See Appendix A 0.1 ppm (0.5 mg/m ³) [skin] OSHA 0.1 ppm (0.5 mg/m ³) [skin]	Ca [10 ppm] ACGIH A2	Colorless, oily liquid with a faint, onion-like odor.	MW: 126.1 BP: 370°F (Decomposes) Sol(64°F): 3% Fl.P: 180°F IP: ?	VP: 0.1 mm FRZ: -25°F UEL: ? LEL: ?	Strong oxidizers, ammonia solutions [Note: Decomposes in water to sulfuric acid; corrosive to metals.]	Peropak-P; Diethyl ether; GC/E Cond; II; [42524]
1595 57	1 ppm = 5.24 mg/m ³				Sp.Gr: 1.33 Class III A Combustible Liquid			
Dinitrobenzene (all isomers) $C_6H_4(NO_2)_2$ o: 528-29-0 C27450000 m: 99-85-0 C27350000 p: 100-25-4 C27525000 1597 56	o: ortho-Dinitrobenzene; 1,2-Dinitrobenzene m: meta-Dinitrobenzene; 1,3-Dinitrobenzene p: para-Nitrobenzene; 1,4-Dinitrobenzene	NIOSH/OSHA 1 mg/m ³ [skin]	200 mg/m ³	Pale white or yellow solids.	MW: 168.1 BP: 606/572/ 570°F Sol: 0.05/ 0.02/0.01% Fl.P: 302/ 302°F/? IP: 10.71/10.43/10.50 eV Sp.Gr(64°F): 1.57/1.58/1.63 Combustible Solids	VP: 7/7/? MLT: 244/ 192/343°F UEL: 7/7/? LEL: 7/7/?	Strong oxidizers, caustics, metals such as tin & zinc [Note: Prolonged exposure to fire and heat may result in an explosion due to SPONTANEOUS decomposition.]	Filter/Bub; Methanol; HPLC/UV/D; II(4) [45214]
Dinitro-o-cresol $CH_3C_6H_3OH(NO_2)_2$ 534-52-1 G09625000 1598 53	4,6-Dinitro-o-cresol; 3,5-Dinitro-2-hydroxy-toluene; 4,6-Dinitro-2-methyl phenol; DN; DNOC	NIOSH/OSHA 0.2 mg/m ³ [skin]	5 mg/m ³	Yellow, odorless solid. [insecticide]	MW: 198.1 BP: 584°F Sol: 0.01% Fl.P: NA IP: ?	VP: 0.00005 mm MLT: 190°F UEL: NA LEL: NA	Strong oxidizers	Filter/Bub; 2-Propanol; HPLC/UV/D; III(5) [45166]
					Sp.Gr: 1.1 (estimated) Noncombustible Solid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: N.R. Goggles: Reason prob Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 50 mg/m ³ : DMF 125 mg/m ³ : PAPRDM/SA,CF ⁴ 250 mg/m ³ : HIEF/SCBAF/SAF 9300 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit upper resp sys, stomach pain	Eye: Irr prompt Skin: Wash regularly Breath: Resp support Swallow: Medical attention immed	Resp sys, GI tract
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Irrit eyes, nose; head; dtdo; con; irrit; photo; periorb edema; dysphonia, aphonia, dysphagia, productive cough; chest pain; dysp, cyan; vomit, diar; dysuria; analgesia; fever; icd; album, hema; skin; eye burns; delirium; [carc]	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Eyes, resp sys, liver, kidneys, CNS, skin
Clothing: Reason prob Goggles: Reason prob Wash: Immed wet/Prompt contam Change: After work if reason prob contam Remove: Immed non-imperv wet/Prompt non-imperv contam Provide: Quick drench	NIOSH/OSHA 5 mg/m ³ : DM 10 mg/m ³ : DMXSO/SA/HIE/SCBA 25 mg/m ³ : PAPRDM/SA,CF 50 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF/SAT,CF 200 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Anoxia, cyan; vis dist, central scotomas; bad taste, burning mouth, dry throat, thirst; yellowing hair; eyes, skin; anemia; liver damage	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Blood, liver, CVS, eyes, CNS
Clothing: Reason prob Goggles: Reason prob Wash: Prompt contam/daily Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 2 mg/m ³ : DMF 5 mg/m ³ : PAPRDM/SA,CF ⁴ /HIEF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Sense of well being; head, fever, lass, profuse sweat, excess thirst, tacar, hyperpnea, cough, short breath, coma	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	CVS, endocrine sys, eyes

Dinitro-o-cresol

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, Sol, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Dinitrotoluene $C_6H_4CH_3(NO_2)_2$ 25321-14-6 XT1300000 1600 56 (liquid) 2038 56 (solid)	Dinitrotoluol, DNT, Methyldinitrobenzene	NIOSH Ca See Appendix A 1.5 mg/m ³ [skin] OSHA 1.5 mg/m ³ [skin]	Ca [200 mg/m ³]	Orange-yellow crystalline solid with a characteristic odor. [Note: Often shipped molten.]	MW: 182.2 BP: 572°F Sol: Insoluble FLP: 404°F IP: ? Sp.Gr: 1.32 Combustible Solid, but difficult to ignite.	VP: 1 mm MLT: 158°F UEL: ? LEL: ?	Strong oxidizers, caustics, metals such as tin & zinc [Note: Commercial grades will decompose at 482°F, with self-sustaining decomposition at 536°F.]	None available
Di-sec octyl phthalate $C_{24}H_{38}O_4$ 117-81-7 T0350000	DEHP, DOP, bis-(2-Ethylhexyl) phthalate, di(2-Ethylhexyl) phthalate, Octyl phthalate [$C_8H_{17}COOC_2H_4CH_2(C_8H_{17}C_2O_2)_2$]	NIOSH Ca See Appendix A 5 mg/m ³ ST 10 mg/m ³ OSHA 5 mg/m ³ ST 10 mg/m ³	Ca [Unknown]	Colorless, oily liquid with a slight odor.	MW: 390.5 BP: 727°F Sol: Insoluble Fl.(ooc): 420°F IP: ? Sp.Gr: 0.99 Class IIIB Combustible Liquid	VP: <0.01 mm FRZ: -58°F UEL: ? LEL(474°F): 0.3%	Nitrates; strong oxidizers, acids & alkalis	Filter: CS; GC/FID; III [#5020, di(2-Ethylhexyl) phthalate]
Dioxane $C_6H_8O_2$ 123-91-1 JG8225000 1165 26	Diethylene dioxide; Diethylene ether; Dioxan; p-Dioxane; 1,4-Dioxane	NIOSH Ca See Appendix A C 1 ppm (3.6 mg/m ³) [30-min] OSHA 25 ppm (90 mg/m ³) [skin]	Ca [2000 ppm]	Colorless liquid or solid (below 53°F) with a mild ether-like odor.	MW: 88.1 BP: 214°F Sol: Miscible FLP: 55°F IP: 9.13 eV Sp.Gr: 1.03 Class IB Flammable Liquid	VP: 29 mm FRZ: 53°F UEL: 22% LEL: 2.0%	Strong oxidizers, decaborane, trimethyl aluminum	Char: CS; GC/FID; III [#1602]
Diphenyl $C_{12}H_{10}C_6H_5$ 92-52-4 DU8050000	Biphenyl, Phenyl benzene	NIOSH/OSHA 1 mg/m ³ (0.2 ppm)	300 mg/m ³	Colorless to pale-yellow solid with a pleasant, characteristic odor.	MW: 154.2 BP: 489°F Sol: Insoluble Fl.P. 235°F IP: 7.95 eV Sp.Gr: 1.04 Combustible Solid	VP(160°F): 1 mm MLT: 156°F UEL(311°F): 5.8% LEL(232°F): 0.6%	Oxidizers	Tenax GC; CCI; GC/FID; III [#2530, Biphenyl]

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Any poss molt/Repeat liq	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVH/E/SCBAE	Inh Abs Ing Con	Anoxia, cyan; anemia, jaun; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Blood, liver, CVS
Goggles:	Any poss molt						
Wash:	Immed wet/Prompt contam/daily						
Change:	After if reason prob contam						
Remove:	Immed non-imperv wet/Prompt non-imperv contam						
Provide:	Quick drench						
Clothing:	N.R.	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Con Ing	Irrit eyes, muc memb; [carc]	Eye: Skin:	Irr immed (Not a dermal hazard)	Eyes, upper resp sys, GI tract
Goggles:	N.R.						
Wash:	N.R.						
Change:	N.R.						
Remove:	N.R.					Breath: Swallow:	Resp support Medical attention immed
Clothing:	Repeat	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Con	Drow, head; nau, vomit; irrit eyes, nose, throat; liver damage; kidney failure; skin irrit; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water wash prompt Resp support Medical attention immed	Liver, kidney, skin, eyes
Goggles:	Reason prob						
Wash:	Prompt contam						
Change:	N.R.						
Remove:	Immed wet (flamm)						
Clothing:	Repeat	NIOSH/OSHA 10 mg/m ³ : CCROVDM/SA/SCBA 25 mg/m ³ : SA-CF/PAPROVDM* 50 mg/m ³ : GMFOVH/E/SCBAF/SAF/ GMFOVH/E/PAPROVH/E* 300 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVH/E/SCBAE	Inh Abs Ing Con	Irrit throat, eyes; head, nau, fig, numb limbs; liver damage	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Liver, skin, CNS, upper resp sys, eyes
Goggles:	Any poss molt/Repeat otherwise						
Wash:	Prompt contam						
Change:	After work, if reason prob contam						
Remove:	Prompt non-imperv contam						

Diphenyl

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Dipropylene glycol methyl ether <chem>CH3OC2H4OC2H4OH</chem> 34590-94-8 JM1575000	Dipropylene glycol monomethyl ether, Dowanol® 50B	NIOSH/OSHA 100 ppm (600 mg/m ³) ST 150 ppm (900 mg/m ³) [skin]	Unknown	Colorless liquid with a mild, ether-like odor.	MW: 148.2 BP: 374°F Sol: Miscible FLP: 180°F IP: ?	VP(79°F): 0.4 mm FRZ: -112°F UEL: ? LEL: ?	Strong oxidizers	Char; CS; GC/FID; I21 [#569]
	1 ppm = 6.16 mg/m ³				Sp.Gr: 0.95 Class IIIA Combustible Liquid			
Endrin <chem>C12H8Cl6O</chem> 72-20-8 101575000	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo-endo-5,8-dimethanonaphthalene; Hexadrin	NIOSH/OSHA 0.1 mg/m ³ [skin]	2000 mg/m ³	Colorless to tan crystalline solid with a mild, chemical odor. [insecticide]	MW: 380.9 BP: Decomposes Sol: Insoluble FLP: NA IP: ?	VP: Low MLT: 392°F (Decomposes) UEL: NA LEL: NA	Strong oxidizers, strong acids, parathion	Filter/ Chrom-102; Toluene; GC/ECD; I11 [#5519]
2761 55					Sp.Gr: 1.70 Noncombustible Solid, but may be dissolved in flammable liquids.			
Epichlorohydrin <chem>C2H3OCl</chem> 106-89-8 TX4900000	1-Chloro-2,3-epoxypropane; 2-Chloropropylene oxide, gamma-Chloropropylene oxide	NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 2 ppm (8 mg/m ³) [skin]	Ca (250 ppm)	Colorless liquid with a slightly irritating, chloroform-like odor.	MW: 92.5 BP: 242°F Sol: 7% FLP: 93°F IP: 10.60 eV	VP: 13 mm FRZ: -54°F UEL: 21.0% LEL: 3.8%	Strong oxidizers, strong acids, certain salts, caustics, zinc, aluminum, water [Note: May polymerize in presence of strong acids and bases, particularly when hot.]	Char; CS; GC/FID; I11 [#1010]
2023 30	1 ppm = 3.85 mg/m ³				Sp.Gr: 1.18 Class IC Flammable Liquid			
EPN <chem>C6H4O(C6H4)P(S)(OC2H4NO2)</chem> 2104-64-5 TB1925000	O-Ethyl O-P-nitrophenyl benzenephosphonothioate, O-Ethyl O-P-nitrophenyl benzenethiophosphonate	NIOSH/OSHA 0.5 mg/m ³ [skin]	50 mg/m ³	Yellow solid with an aromatic odor. [Note: A brown liquid above 97°F.] (pesticide)	MW: 323.3 BP: 7 Sol: Insoluble FLP: NA IP: ?	VP(212°F): 0.0003 mm MLT: 97°F UEL: NA LEL: NA	Strong oxidizers	Filter; Isocytane; GC/FPD; I11 [#5012]
					Sp.Gr(77°F): 1.27 Noncombustible Solid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	N.R.	NIOSH/OSHA	Inh	Irrit eyes, nose; weak, li-	Eye:	Irr immed	Resp sys, eyes
Goggles:	N.R.	1000 ppm: SA/SCBA	Abs	head, head	Skin:	Water wash prompt	
Wash:	N.R.	2500 ppm: SA, CF	Ing		Breath:	Resp support	
Change:	N.R.	5000 ppm: SCBAF/SAF/SAT, CF	Con		Swallow:	Medical attention immed	
Remove:	N.R.	§: SCBAF-PD, PP/SAF-PD, PP-ASCBA					
Provide:		Escape: GMFOVHIE/SCBAE					
Clothing:	Any poss	NIOSH/OSHA	Inh	Epileptiform convuls;	Eye:	Irr immed	CNS, liver
Goggles:	Any poss	1 mg/m ³ : CCRQVDMFu/SA/SCBA	Abs	stupor, head, dizz; abdom	Skin:	Soap wash immed	
Wash:	Immed contam	2.5 mg/m ³ : SA, CF/PAPROVDMFu	Ing	discomfort, nau, vomit;	Breath:	Resp support	
Change:	After work if any poss contam	5 mg/m ³ : CCRFOVHIE/SCBAF/SAF/GMFOVHIE/PAPRTOVHIE/SAT, CF	Con	conf; lethargy, weak; anor; in animals: liver damage	Swallow:	Medical attention immed	
Remove:	Immed non-imperv contam	100 mg/m ³ : SA, PD, PP					
Provide:	Eyewash, quick drench	200 mg/m ³ : SAF, PD, PP					
		§: SCBAF-PD, PP/SAF-PD, PP-ASCBA					
		Escape: GMFOVHIE/SCBAE					
Clothing:	Any poss	NIOSH	Inh	Nau, vomit; abdom pain;	Eye:	Irr immed	Resp sys, skin,
Goggles:	Any poss	V: SCBAF-PD, PP/SAF-PD, PP-ASCBA	Abs	resp distress, cough;	Skin:	Soap wash immed	kidneys
Wash:	Immed contam	Escape: GMFOVAG/SCBAE	Ing	cyan; irrit eyes, skin with	Breath:	Resp support	
Change:	N.R.		Con	deep pain; [carc]	Swallow:	Medical attention immed	
Remove:	Immed non-imperv contam						
Provide:	Eyewash, quick drench						
Clothing:	Any poss	NIOSH/OSHA	Inh	Miosis, lac, rin; head;	Eye:	Irr immed	Resp sys, CVS,
Goggles:	Any poss	5 mg/m ³ : SA/SCBA	Abs	tight chest; wheez, lar	Skin:	Soap wash immed	CNS, eyes, skin,
Wash:	Immed contam	12.5 mg/m ³ : SA, CF	Ing	spasm; saliv; cyan; anor,	Breath:	Resp support	blood chol
Change:	After work if any poss contam	25 mg/m ³ : SCBAF/SAF/SAT, CF	Con	nau, abdom cramp, diarr;	Swallow:	Medical attention immed	
Remove:	Immed non-imperv contam	50 mg/m ³ : SA, PD, PP		para, convuls; low BP;			
Provide:	Eyewash, quick drench	§: SCBAF-PD, PP/SAF-PD, PP-ASCBA		card irregularities; irrit skin, eyes			
		Escape: GMFOVHIE/SCBAE					

Chemical name, structure/formula, CAS and RTECS No., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, F.P., IP, Sp.Gr., flammability	VP, FRZ, UEL, LEL		
Ethanolamine NH ₂ CH ₂ CH ₂ OH 141-43-5 KJ5775000	2-Aminoethanol, beta-Aminoethyl alcohol, Ethylamine, 2-Hydroxyethylamine, Monoethanolamine	NIOSH/OSHA 3 ppm (8 mg/m ³) ST 6 ppm (15 mg/m ³)	1000 ppm	Colorless, viscous liquid or solid (below 51°F) with an unpleasant, ammonia-like odor.	MW: 61.1 BP: 339°F Sol: Miscible F.P.: 185°F IP: 8.96 eV	VP: 0.4 mm FRZ: 51°F UEL: 7 LEL: 7	Strong oxidizers, strong acids	Si gel; Methanol/ Water; GC/FID; III [#2007, Aminoethanol Compounds]
2491 60 2-Ethoxyethanol C ₂ H ₅ OCH ₂ CH ₂ OH 110-80-5 KK8050000	Cellulosolve®, EGEE, Ethylene glycol monoethyl ether	NIOSH Reduce exposure to lowest feasible concentration. OSHA 200 ppm (740 mg/m ³) [skin]	* (800 ppm) *Not applicable because of the NIOSH REL.	Colorless liquid with a sweet, pleasant, ether-like odor.	MW: 90.1 BP: 275°F Sol: Miscible F.P.: 110°F IP: 7	VP: 4 mm FRZ: -130°F UEL(200°F): 15.6% LEL(200°F): 1.7%	Strong oxidizers	Char; CH ₂ Cl ₂ ; Methanol; GC/FID; III [#1403, Alcohols IV]
1171 26 2-Ethoxyethyl acetate CH ₃ COOCH ₂ CH ₂ OC ₂ H ₅ 111-15-9 KK8225000	Cellulosolve® acetate, EGEEA, Ethylene glycol monoethyl ether acetate, Glycol monoethyl ether acetate	NIOSH Reduce exposure to lowest feasible concentration. OSHA 100 ppm (540 mg/m ³) [skin]	* (2500 ppm) *Not applicable because of the NIOSH REL.	Colorless liquid with a mild odor.	MW: 132.2 BP: 313°F Sol: 23% F.P.: 124°F IP: 7	VP: 2 mm FRZ: -79°F UEL: 7 LEL: 1.7%	Nitrates; strong oxidizers, alkalis & acids	Char; CS ₂ ; GC/FID; III [#1450, Esters I]
1172 26 Ethyl acetate CH ₃ COOC ₂ H ₅ 141-78-6 AH5425000	Acetic ester, Acetic ether, Ethyl ester of acetic acid, Ethyl ethanoate	NIOSH/OSHA 400 ppm (1400 mg/m ³)	10,000 ppm	Colorless liquid with an ether-like, fruity odor.	MW: 88.1 BP: 171°F Sol(77°F): 10% F.P.: 24°F IP: 10.01 eV	VP: 74 mm FRZ: -117°F UEL: 11.5% LEL: 2.0%	Nitrates; strong oxidizers, alkalis & acids	Char; CS ₂ ; GC/FID; I(2) [#548]
1173 26		1 ppm = 3.66 mg/m ³			Sp.Gr: 0.90 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam Provide: Eyewash	NIOSH/OSHA 30 ppm: SA*/SCBA*/CCRS* 75 ppm: SA,CF*/PAPRS* 150 ppm: CCRFS/GMFS/SCBAF/SAF 1000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Resp sys, skin, eye irrit; lethargy	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Skin, eyes, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv contam	NIOSH †: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	In animals: pulm irrit; hematologic effects; liver, kidneys, lung damage, irrit eyes	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	In animals: lungs, eyes, blood, kidneys, liver
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	†: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose; vomit; kidney damage; para	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Resp sys, eyes, GI tract
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: CCRFOV/PAPROV† 10,000 ppm: GMFOV/SCBAF/SAF/ SA,CF† §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; narco; derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin, resp sys

Ethyl acetate

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Ethyl acrylate $\text{CH}_2=\text{CHCOOC}_2\text{H}_5$ 140-88-5 AT0700000	Ethyl acrylate (inhibited), Ethyl ester of acrylic acid, Ethyl propenoate	NIOSH Ca See Appendix A OSHA 5 ppm (20 mg/m ³) ST 25 ppm (100 mg/m ³) [skin]	Ca [2000 ppm]	Colorless liquid with an acid odor.	MW: 100.1 BP: 211°F Sol: 2% FLP: 48°F IP: ? Sp.Gr: 0.92 Class IB Flammable Liquid	VP: 29 mm FRZ: -96°F UEL: 14% LEL: 1.4%	Oxidizers, peroxides, polymerizers, strong alkalis, moisture, chlorosulfonic acid [Note: Polymerizes readily unless an inhibitor such as hydroquinone is added.]	Char; CS ₂ ; GC/FID; III [#1450, Esters I]
1917 27	1 ppm = 4.16 mg/m ³							
Ethylamine $\text{CH}_3\text{CH}_2\text{NH}_2$ 75-04-7 KH2100000	Aminoethane, Ethylamine (anhydrous), Monoethylamine	NIOSH/OSHA 10 ppm (16 mg/m ³)	4000 ppm	Colorless gas or water-white liquid (below 62°F) with an ammonia-like odor. [Note: Shipped as a liquefied compressed gas.]	MW: 45.1 BP: 62°F Sol: Miscible FLP: 1°F IP: 8.86 eV Sp.Gr: 0.69 (Liquid) Flammable Gas Class IA Flammable Liquid	VP: >1 atm FRZ: -114°F UEL: 14.0% LEL: 3.5%	Strong acids; strong oxidizers; copper, tin & zinc in presence of moisture; cellulose nitrate	Si gel; H ₂ SO ₄ ; GC/FID; III(3) [#5144]
1036 68	1 ppm = 1.87 mg/m ³							
Ethyl benzene $\text{CH}_3\text{CH}_2\text{C}_6\text{H}_5$ 100-41-4 DA0700000	Ethylbenzol, Phenylethane	NIOSH/OSHA 100 ppm (435 mg/m ³) ST 125 ppm (545 mg/m ³)	2000 ppm	Colorless liquid with an aromatic odor.	MW: 106.2 BP: 277°F Sol: 0.01% FLP: 55°F IP: 8.76 eV Sp.Gr: 0.87 Class IB Flammable Liquid	VP(79°F): 10 mm FRZ: -139°F UEL: 6.7% LEL: 1.0%	Strong oxidizers	Char; CS ₂ ; GC/FID; III [#1501, Aromatic Hydrocarbons]
1175 26	1 ppm = 4.41 mg/m ³							
Ethyl bromide $\text{CH}_3\text{CH}_2\text{Br}$ 74-96-4 KH6475000	Bromoethane	NIOSH See Appendix D OSHA 200 ppm (890 mg/m ³) ST 250 ppm (1110 mg/m ³)	3500 ppm	Colorless to yellow liquid with an ether-like odor. [Note: A gas above 101°F.]	MW: 109.0 BP: 101°F Sol: 0.9% FLP: <4°F IP: 10.29 eV Sp.Gr: 1.46 Class IB Flammable Liquid	VP(70°F): 400 mm FRZ: -182°F UEL: 8.0% LEL: 6.8%	Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium	Char; 2-Propanol; GC/FID; III [#1011]
1891 58	1 ppm = 4.53 mg/m ³							

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, resp sys, skin; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, eyes, skin
Clothing: Reason prob Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet/Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 250 ppm: SA,CF ¹ /PAPRS ² 500 ppm: CCRFS/GMFS/SCBAF/SAF 4000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Irrit eyes; burns skin; resp irrit; derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, eyes, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: PAPROV ¹ /SA ¹ /SCBA ¹ / CCROV ² 2000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, muc memb; head; derm; narco, coma	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, upper resp sys, skin, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	OSHA 2000 ppm: SA/SCBA 3500 ppm: SA,CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, resp sys, skin; CNS depres; pulm edema; liver, kidney disease; card arrhy; card arrest	Eye: Skin: Breath: Swallow:	Irr immed Soap flush prompt Resp support Medical attention immed	Skin, liver, kidneys, resp sys, CVS, CNS

Ethyl bromide

Chemical name, structure/formula, CAS and RTECS No., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Ethyl butyl ketone $\text{CH}_3\text{CH}_2\text{CO}(\text{CH}_2)_3\text{CH}_3$ 106-35-4 MJ5250000	Butyl ethyl ketone, 3-Heptanone	NIOSH/OSHA 50 ppm (230 mg/m ³)	3000 ppm	Colorless liquid with a powerful, fruity odor.	MW: 114.2 BP: 298°F Sol: 1% FLP(oc): 115°F IP: 9.02 eV	VP: 4 mm FRZ: -38°F UEL: ? LEL: ?	Oxidizers, acetaldehyde, perchloric acid	Char; Methanol/ CS ₂ ; GC/FID; III [#1301, Ketones II]
	1 ppm = 4.75 mg/m ³				Sp.Gr: 0.82 Class II Combustible Liquid			
Ethyl chloride $\text{CH}_3\text{CH}_2\text{Cl}$ 75-00-3 KH7525000	Chloroethane, Hydrochloric ether, Monochloroethane, Muriatic ether	NIOSH See Appendix D Handle with caution in the workplace. OSHA 1000 ppm (2600 mg/m ³)	20,000 ppm	Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. [Note: Shipped as a liquefied compressed gas.]	MW: 64.5 BP: 54°F Sol: 0.6% F.L.P. NA (Gas) IP: 10.97 eV	VP: >1 atm FRZ: -218°F UEL: 15.4% LEL: 3.8%	Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; oxidizers; water or steam [Note: Reacts with water to form hydrochloric acid.]	Char(2); CS ₂ ; GC/FID; III [#2519]
1037 27	1 ppm = 2.68 mg/m ³				Sp.Gr: 0.92 [Liquid at 32°F] Flammable Gas Class IA Flammable Liquid			
Ethylene chlorohydrin $\text{CH}_2\text{ClCH}_2\text{OH}$ 107-07-3 KK0875000	2-Chloroethanol, 2-Chloroethyl alcohol, Ethylene chlorohydrin	NIOSH/OSHA C 1 ppm (3 mg/m ³) [skin]	10 ppm	Colorless liquid with a faint, ether-like odor.	MW: 80.5 BP: 252°F Sol: Miscible F.L.P. 140°F IP: 10.90 eV	VP: 5 mm FRZ: -90°F UEL: 15.9% LEL: 4.9%	Strong oxidizers, strong caustics, water or steam	Char(pet); 2-Propanol/ CS ₂ ; GC/FID; III [#2513]
1135 55	1 ppm = 3.35 mg/m ³				Sp.Gr: 1.20 Class IIIA Combustible Liquid			
Ethylenediamine $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$ 107-15-3 KH8575000	1,2-Diaminoethane; 1,2-Ethanediamine; Ethylenediamine (anhydrous)	NIOSH/OSHA 10 ppm (25 mg/m ³)	2000 ppm	Colorless, viscous liquid with an ammonia-like odor. [Note: A solid below 47°F.] [fungicide]	MW: 60.1 BP: 241°F Sol: Miscible F.L.P. 93°F IP: 8.60 eV	VP: 11 mm FRZ: 47°F UEL: 14.4% LEL: 4.2%	Strong acids & oxidizers, carbon tetrachloride & other chlorinated organic compounds, carbon disulfide [Note: Corrosive to metals.]	XAD-2*; DMF; HPLC/UV/D; III [#2540]
1604 29	1 ppm = 2.50 mg/m ³				Sp.Gr: 0.91 Class IC Flammable Liquid			

Personal protection and sanitation (See Table 2)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 500 ppm: CCRDV/SA/SCBA* 1000 ppm: PAPROV/CCRFOV 1250 ppm: SA/CF* 2500 ppm: GMFOV/SCBAF/SAF 3000 ppm: SAF/PD,PP ‡: SCBAF/PD,PP/SAF/PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, muc memb; head; narco, coma; derm	Eye: Skin: Breath: Swallow:	Irr Immed Water flush Resp support Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)	OSHA 10,000 ppm: SA/SCBA* 20,000 ppm: SA/CF/SCBAF/SAF ‡: SCBAF/PD,PP/SAF/PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Inco, inebriate; abdom cramps; card arrhy, card arrest; liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr Immed Water flush prompt Resp support Medical attention immed	Liver, kidneys, resp sys, CVS
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 10 ppm: SCBA/SA* ‡: SCBAF/PD,PP/SAF/PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit muc memb; nau, vomit; vert, inco; numb; vis dist; head; thirst; delirium; low BP; collapse, shock, coma	Eye: Skin: Breath: Swallow:	Irr Immed Water flush immed Resp support Medical attention immed	Resp sys, liver, kidneys, CNS, skin, CVS
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed wet/immed non-imperv contam Provide: Eyewash (>5%), quick drench	NIOSH/OSHA 250 ppm: SA/CF ¹ /PAPRS ¹ 500 ppm: CCRFS/GMFS/SCBAF/SAF 2000 ppm: SAF/PD,PP ‡: SCBAF/PD,PP/SAF/PD,PP/ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Nasal irrit; primary irrit; sens derm, irrit resp sys, asthma; liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr Immed Water flush immed Resp support Medical attention immed	Resp sys, liver, kidneys, skin

Ethylendiamine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Ethylene dibromide BrCH ₂ CH ₂ Br 106-93-4 KH9275000	1,2-Dibromoethane; Ethylene bromide; Glycol dibromide	NIOSH Ca See Appendix A 0.045 ppm C 0.13 ppm [15-min] OSHA 20 ppm C 30 ppm 50 ppm [5-min max peak]	Ca [400 ppm]	Colorless liquid or solid (below 50°F) with a sweet odor.	MW: 187.9 BP: 268°F Sol: 0.4% FLP: NA IP: 9.45 eV	VP: 12 mm FRZ: 50°F UEL: NA LEL: NA	Chemically-active metals such as sodium, potassium, calcium, hot aluminum & magnesium; liquid ammonia; strong oxidizers	Char; Benzene/ Methanol; GC/EC/D; III [#1008]
1605 55	1 ppm = 7.81 mg/m ³				Sp.Gr: 2.17 Noncombustible Liquid			
Ethylene dichloride ClCH ₂ CH ₂ Cl 107-06-2 KI0525000	1,2-Dichloroethane; Ethylene chloride; Glycol dichloride	NIOSH Ca See Appendix A 1 ppm (4 mg/m ³) ST 2 ppm (8 mg/m ³) OSHA 1 ppm (4 mg/m ³) ST 2 ppm (8 mg/m ³)	Ca [1000 ppm]	Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.]	MW: 99.0 BP: 182°F Sol: 0.9% FLP: 56°F IP: 11.05 eV	VP: 64 mm FRZ: -32°F UEL: 16% LEL: 6.2%	Strong oxidizers & caustics; chemically-active metals such as aluminum or magnesium powder, sodium & potassium; liquid ammonia [Note: Decomposes to vinyl chloride & HCl above 1112°F.]	Char; CS; GC/FID; III [#1003, Halogenated Hydrocarbons]
1184 26	1 ppm = 4.11 mg/m ³				Sp.Gr: 1.24 Class IB Flammable Liquid			
Ethylene glycol dinitrate O ₂ NOCH ₂ CH ₂ ONO ₂ 629-96-6 KW5600000	EGDN; 1,2-Ethanediol dinitrate; Ethylene dinitrate; Ethylene nitrate; Glycol dinitrate; Nitroglycol	NIOSH/OSHA ST 0.1 mg/m ³ [skin] [Note: OSHA stayed the start-up date of the PEL on 12/6/89 for the explosives industry until 2/1/90.]	500 mg/m ³	Colorless to yellow, oily, odorless liquid. [Note: An explosive ingredient (60-80%) in dynamite along with nitroglycerine (40-20%).]	MW: 152.1 BP: 387°F Sol: Insoluble FLP: 419°F IP: ?	VP: 0.05 mm FRZ: -8°F UEL: ? LEL: ?	Acids, alkalis	Tenax GC; Ethanol; GC/EC/D; III [#2507]
Ethyleneimine C ₂ H ₅ N 151-56-4 KX5075000	Aminoethylene, Azirane, Aziridine, Dimethyleneimine, Dimethyleneimine, Ethyleneimine, Ethyline	NIOSH Ca See Appendix A OSHA [1910.1012] See Appendix B	Ca [100 ppm]	Colorless liquid with an ammonia-like odor.	MW: 43.1 BP: 133°F Sol: Miscible FLP: 12°F IP: 9.20 eV	VP: 160 mm FRZ: -97°F UEL: 46% LEL: 3.6%	Polymerizes explosively in presence of acids [Note: Explosive silver derivatives may be formed with silver alloys (e.g., silver solder).]	Bub; CHCl ₃ ; HPLC/UVD; II(5) [P&CAM #300]
1185 30 (inhibited)	1 ppm = 1.79 mg/m ³				Sp.Gr: 0.83 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection → maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit resp sys, eyes; derm with vesic; [carc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, liver, kidneys, skin, eyes	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Abs Con	CNS depres; nau, vomit; derm; irrit eyes, corneal opacity; [carc]	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Kidneys, liver, eyes, skin, CNS	
Clothing: Any poss Goggles: Reason prob Wash: Immed contam Change: Alter work if any poss contam Remove: Immed wet (flamm) Provide: Quick drench	NIOSH/OSHA 1 mg/m ³ : SA*/SCBA* 2.5 mg/m ³ : SA,CF* 5 mg/m ³ : SCBAF/SAF/SAT/CF* 200 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Throb head; dizz; nau, vomit, abdom pain; hypotension, flush; palp; methemoglobinemia; delirium, depres CNS; angina; skin irrit; in animals: anemia; mild liver, kidney damage	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	CVS, blood, skin	
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: Alter work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Con Ing	Nau, vomit; head, dizz; pulm edema; liver, kidney damage; eye burns; skin sens; irrit nose, throat; [carc]	Eye: Irr immed (15 min) Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Eyes, lungs, skin, liver, kidneys	

Ethyleneimine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits TWA unless noted otherwise	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Ethylene oxide C_2H_4O 75-21-8 KX2450000	Dimethylene oxide; 1,2-Epoxy ethane; Oxirane	NIOSH Ca See Appendix A <0.1 ppm (0.18 mg/m ³) C 5 ppm (9 mg/m ³) (10-min/day) OSHA (1910.1047) 1 ppm 5 ppm [15-min Excursion]	Ca [800 ppm]	Colorless gas or liquid (below 51°F) with an ether-like odor.	MW: 44.1 BP: 51°F Sol: Miscible Fl.P(oc): -20°F IP: 10.56 eV	VP: >1 atm FRZ: -171°F UEL: 100% LEL: 3.0%	Strong acids, alkalis & oxidizers; chlorides of iron, aluminum & tin; oxides of iron & aluminum	Char(pel); DMF; GC/ECD; II [#1614]
1040 69	1 ppm = 1.83 mg/m ³				Sp.Gr: 0.82 (Liquid at 50°F) Class IA Flammable Liquid			
Ethyl ether $C_2H_5OC_2H_5$ 60-29-7 KIS775000	Diethyl ether, Ethyl oxide, Ether, Diethyl oxide, Solvent ether	NIOSH See Appendix D OSHA 400 ppm (1200 mg/m ³) ST 500 ppm (1500 mg/m ³)	19,000 ppm [LEL]	Colorless liquid with a pungent, sweetish odor. [Note: A gas above 84°F.]	MW: 74.1 BP: 94°F Sol: 8% Fl.P: -49°F IP: 9.53 eV	VP: 440 mm FRZ: -177°F UEL: 36.0% LEL: 1.9%	Strong oxidizers [Note: Tends to form explosive peroxides under influence of air & light.]	Char; Ethyl acetate; GC/FID; III [#1610]
1155 26	1 ppm = 3.08 mg/m ³				Sp.Gr: 0.71 Class IA Flammable Liquid			
Ethyl formate CH_3CH_2OCHO 109-94-4 LQ8400000	Ethyl ester of formic acid, Ethyl methanoate	NIOSH/OSHA 100 ppm (300 mg/m ³)	8000 ppm	Colorless liquid with a fruity odor.	MW: 74.1 BP: 130°F Sol(64°F): 9% Fl.P: -4°F IP: 10.61 eV	VP: 200 mm FRZ: -113°F UEL: 16.0% LEL: 2.8%	Nitrates; strong oxidizers, alkalis & acids [Note: Decomposes slowly in water to form ethyl alcohol & formic acid.]	Char; CS; GC/FID; II(2) [#536]
1190 26	1 ppm = 3.08 mg/m ³				Sp.Gr: 0.92 Class IB Flammable Liquid			
Ethyl mercaptan CH_3CH_2SH 75-08-1 K19625000	Ethanethiol, Ethyl sulfhydrate, Mercaptoethane	NIOSH C 0.5 ppm (1.3 mg/m ³) [15-min] OSHA 0.5 ppm (1 mg/m ³)	2500 ppm	Colorless liquid with a strong skunk-like odor. [Note: A gas above 95°F.]	MW: 62.1 BP: 95°F Sol: 0.7% Fl.P: -55°F IP: 9.29 eV	VP: 442 mm FRZ: -228°F UEL: 18.0% LEL: 2.8%	Strong oxidizers [Note: Reacts violently with calcium hypochlorite.]	None available
2363 27	1 ppm = 2.58 mg/m ³				Sp.Gr: 0.84 Class IA Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash	NIOSH 5 ppm: GMFS1/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS1/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; peculiar taste; head; nau, vomit, diarr; dyp, cyan, pulm edema; drow, weak, inco; EKG abnormalities; burns eyes, skin; frostbite; in animals: convuls; liver, kidney damage	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Eyes, blood, resp sys, liver, CNS, kidneys
Clothing: Repeat Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)	OSHA 1000 ppm: CCROV*/PAPROV* 4000 ppm: SA*/SCBA* 10,000 ppm: SA,CF* 19,000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Dizz; drow; head, excited, narco; nau, vomit; irrit eyes, upper resp sys, skin	Eye: Irr immed Skin: Water wash prompt Breath: Resp support Swallow: Medical attention immed	CNS, skin, resp sys, eyes
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Any wet immed (flamm)	NIOSH/OSHA 1000 ppm: CCRFOV/PAPROV* 2500 ppm: SA,CF* 5000 ppm: GMFOV/SCBAF/SAF 8000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, upper resp sys; narco	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Eyes, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 5 ppm: SA/SCBA/CCROV 12.5 ppm: SA,CF/PAPROV 25 ppm: SCBAF/SAF/GMFOV/PAPRTOV/ CCRFOV/SAT,CF 500 ppm: SA-PD,PP 1000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Head, nau, irrit muc memb; in animals: inco; weak; pulm irrit; liver, kidney damage; cyan	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys; in animals: liver, kidneys

Ethyl mercaptan

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, Flammability	VP, FRZ UEL, LEL		
N-Ethylmorpholine $C_4H_9ONCH_2CH_3$ 100-74-3 QE4025000	4-Ethylmorpholine	NIOSH/OSHA 5 ppm (23 mg/m ³) [skin]	2000 ppm	Colorless liquid with an ammonia-like odor.	MW: 115.2 BP: 281°F Sol: Miscible FLP(oc): 90°F IP: ?	VP: 6 mm FRZ: -81°F UEL: ? LEL: ?	Strong acids, strong oxidizers	Si gel; H ₂ SO ₄ ; GC/FID; I(3) [#S146]
	1 ppm = 4.79 mg/m ³				Sp.Gr: 0.90 Class IC Flammable Liquid			
Ethyl silicate $(C_2H_5)_2SiO_2$ 78-10-4 VV9450000	Ethyl orthosilicate, Ethyl silicate (condensed), Tetraethoxysilane, Tetraethyl silicate	NIOSH/OSHA 10 ppm (85 mg/m ³)	1000 ppm	Colorless liquid with a sharp, alcohol-like odor.	MW: 208.3 BP: 336°F Sol: Reacts FLP: 99°F IP: 9.77 eV	VP: 1 mm FRZ: -117°F UEL: ? LEL: ?	Strong oxidizers, water [Note: Reacts with water to form a silicone adhesive (a milky-white mass).]	XAD-2; CS ₂ ; GC/FID; I(3) [#S264]
1292 29	1 ppm = 8.86 mg/m ³				Sp.Gr: 0.93 Class IC Flammable Liquid			
Ferbam $((CH_3)_2NCS_2)_3Fe$ 14484-64-1 NO8750000	tris(Dimethyldithiocarbamate)iron, Ferric dimethyl dithiocarbamate	NIOSH/OSHA 10 mg/m ³	N.E.	Dark brown to black, odorless solid, [fungicide]	MW: 416.5 BP: Decomposes Sol: 0.01% FLP: ? IP: 7.72 eV	VP: Low MLT: >356°F (Decomposes) UEL: ? LEL: ?	Strong oxidizers	None available
					Combustible Solid			
Ferrovandium dust FeV 12604-58-9 LK2900000	None	NIOSH/OSHA 1 mg/m ³ ST 3 mg/m ³	N.E.	Dark, odorless particulate dispersed in air. [Note: Ferrovandium metal is an alloy usually containing 50-80% vanadium.]	MW: 106.8 BP: ? Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 2696 to 2768°F UEL: NA LEL: NA	Strong oxidizers	Filter; Acid; AA; OSHA [#ID121, #ID125G]
					Noncombustible Solid, but dust may be an explosion hazard.			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 5)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash (>15%), quick drench	NIOSH/OSHA 50 ppm: SA*/SCBA*/CCROV* 125 ppm: SA,CF*/PAPROV* 250 ppm: SCBAF/SAF/CCRFOV/ GMFOV/PAPTOV*/SAT,CF* 2000 ppm: SAF,PD,PP §: SCBAF,PD,PP/SAF,PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Eye, nose, throat irrit; vis dist; severe eye irrit from splashes	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Resp sys, eyes, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 100 ppm: SA*/SCBA* 250 ppm: SA,CF* 500 ppm: SCBAF/SAF 1000 ppm: SAF,PD,PP §: SCBAF,PD,PP/SAF,PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose; in animals: lac; dysp, pulm edema; tremor, narco; liver, kidney damage; anemia	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, liver, kidneys, blood, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: Alter work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 50 mg/m ³ : D 100 mg/m ³ : DXSQ*/SA*/SCBA*/HIE* 250 mg/m ³ : PAPRD*/SA,CF* 500 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIE*/SAT,CF* 5000 mg/m ³ : SAF,PD,PP §: SCBAF,PD,PP/SAF,PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit eyes, resp tract; derm; GI dist	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin, GI tract
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 5 mg/m ³ : DM* 10 mg/m ³ : D XSQ*/SA*/SCBA* 25 mg/m ³ : PAPRDM*/SA,CF* 50 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIE*/SAT,CF* 500 mg/m ³ : SAF,PD,PP §: SCBAF,PD,PP/SAF,PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Con	Irrit eyes, resp sys; in animals: bron, pneumitis	Eye: Breath:	Irr immed Resp support	Resp sys, eyes

Ferrovandium dust

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Fluorides (as F) 1: NaF 2: Na ₂ AlF ₆ 1: 761-49-4/ WB0350000 2: 15096-52-3/ WA9625000 1690 54 (NaF)	1: Sodium fluoride, Fluoride 2: Cryolite, Cryolite, Cryodust, Sodium aluminum fluoride, Sodium hexafluoroaluminate Synonyms of other compounds vary depending upon the specific compound.	NIOSH/OSHA 2.5 mg/m ³	500 mg/m ³	1: Odorless white powder or colorless crystals. [Note: Pesticide grade is often dyed blue.] 2: Colorless to dark colorless solid. [Note: Loses color on heating.] [pesticide]	MW: 42.0/209.9 BP: 3099°F/ Decomposes Sol: 40.04% F.P: NA/NA IP: NA/NA Sp.Gr: 2.78/2.90 Noncombustible Solids	VP: 0/0 mm (approx) MLT: 1819/ 1832°F UEL: NA/NA LEL: NA/NA	Strong oxidizers	None available
Fluorine F ₂ 7782-41-4 LM6475000 9192 25 (cryogenic liquid) 1045 20 (compressed)	Fluorine-19 1 ppm = 1.58 mg/m ³	NIOSH/OSHA 0.1 ppm (0.2 mg/m ³)	25 ppm	Pale yellow to greenish gas with a pungent, irritating odor.	MW: 38.0 BP: -307°F Sol: Reacts F.P: NA IP: 15.70 eV	VP: >1 atm FRZ: -363°F UEL: NA LEL: NA	Water, nitric acid, oxidizers, organic compounds [Note: Reacts violently with all combustible materials, except the metal containers in which it is shipped. Reacts with H ₂ O to form hydrofluoric acid.]	None available
Fluorochloromethane CCl ₂ F 75-69-4 PB6125000 1078 12 (gas)	Freon® 11, Monofluorotrichloromethane, Trichlorofluoromethane, R11, R11 1 ppm = 5.71 mg/m ³	NIOSH/OSHA C 1000 ppm (5600 mg/m ³)	10,000 ppm	Colorless to water-white, nearly odorless liquid or gas (above 75°F).	MW: 137.4 BP: 75°F Sol(77°F): 0.1% F.P: NA IP: 11.77 eV Sp.Gr: 1.47 (Liquid at 75°F) Noncombustible Liquid	VP: 690 mm FRZ: -168°F UEL: NA LEL: NA	Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc, magnesium & lithium shavings; granular barium	Char; CB; GC/FID; III #1006, Trichloro- fluoro- methane]
Formaldehyde HCHO 50-00-0 LF8925000 1198 29 (formalin) 2209 29 (formalin)	1) Gaseous form: Methanal, Methyl aldehyde, Methylene oxide 2) Aqueous solution: Formalin (30 to 50% formaldehyde by weight, which usually contains 6 to 12% methanol)	NIOSH Ca See Appendix A 0.016 ppm C 0.1 ppm (15-min) OSHA [1910.1048] 1 ppm ST 2 ppm	Ce [30 ppm] ACGIH A2	Nearly colorless gas with a pungent, suffocating odor. [Note: Often used in an aqueous solution.]	MW: 30.0 BP: -6/207 to 214°F Sol: Miscible F.P: NA(Gas)/ 140-185°F IP: 10.88 eV/7 Sp.Gr(77°F): 1.08-1.10 (Formalin) Flammable Gas Class IIIB Combustible Liquid (Formalin)	VP: >1 atm/ 1 mm FRZ: -134°F/7 UEL: 73%/7 LEL: 7.0%/7	Strong oxidizers, alkalis & acids, phenols; urea [Note: Pure formaldehyde has a tendency to polymerize.]	Filter/Imp(2); none; Vis; III #3500 [Note: Also XAD-2; Toluene; GC/FID; #2541.]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: After work if any poss contam Remove: Promptly non-imperv contam	NIOSH/OSHA 12.5 mg/m ³ : DM 25 mg/m ³ : DMXSO*/SA*/SCBA* 62.5 mg/m ³ : PAPRDM*/SA,CF* 125 mg/m ³ : SCBAF/SAF/HIEF† 500 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit eyes, resp sys; nau, abdom pain, diarr; excess saliv, thirst, sweat; stiff spine; derm; calcification of ligaments of ribs, pelvis	Eye: Irr immed Skin: Soap wash prompt Breath: Fresh air, art resp Swallow: Medical attention immed	Eyes, resp sys, CNS, skeleton, kidneys, skin
	†Note: May need acid gas sorbent				
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 1 ppm: SA*/SCBA* 2.5 ppm: SA,CF* 5 ppm: SCBAF/SAF 25 ppm: SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Con	Irrit eyes, nose, resp tract; lar spasm, bron spasm; pulm edema; eyes, skin burns; in animals: liver, kidney damage	Eye: Irr immed Skin: Water flush immed Breath: Resp support	Resp sys, eyes, skin; in animals: liver, kidneys
Clothing: Repeat Goggles: Any poss Wash: N.R. Change: N.R. Remove: Prompt non-imperv wet Provide: Eyewash, quick drench	NIOSH/OSHA 10,000 ppm: SA/SCBA ‡: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Inco, tremors; derm; frostbite; card arrhy, card arrest	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	CVS, skin
Clothing: Reason prob Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH ‡: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; lac, burns nose, cough; bron spasm, pulm irrit; derm; [carc]	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes, skin

Formaldehyde

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL.P, IP, Sp.Gr., flammability	VP, FRZ UEL, LEL		
Formic acid HCOOH 64-18-6 LO490000	Formic acid, 85-95% in aqueous solution; Hydrogenocarbonylic acid; Methanoic acid	NIOSH/OSHA 5 ppm (9 mg/m ³)	30 ppm	Colorless liquid with a pungent, penetrating odor. [Note: Often used in an aqueous solution. The 90% solution freezes at 20°F.]	MW: 46.0 BP: 224°F (90% soln) Sol: Miscible FL.P.(oc): 122°F (90% soln) IP: 11.05 eV Sp.Gr: 1.22 (90% soln) Class IIIA Combustible Liquid	VP: 35 mm FRZ: 20°F (90% soln) UEL: 57% (90% soln) LEL: 18% (90% soln)	Strong oxidizers, strong caustics, concentrated sulfuric acid [Note: Corrosive to metals.]	Filter/ Chrom- 103 (2); Water; IC: II(5) [#5173]
1779 60	1 ppm = 1.91 mg/m ³							
Furfural C ₅ H ₄ OCHO 98-01-1 LT700000	Fural, 2-Furaldehyde, 2-Furancarboxaldehyde, Furfuraldehyde	NIOSH See Appendix D OSHA 2 ppm (8 mg/m ³) [skin]	250 ppm	Colorless to amber liquid with an almond-like odor. [Note: Darkens in light and air.]	MW: 96.1 BP: 323°F Sol: 8% FL.P: 140°F IP: 9.21 eV Sp.Gr: 1.16 Class IIIA Combustible Liquid	VP(66°F): 1 m.; FRZ: -34°F UEL: 15.3% LEL: 2.1%	Strong acids, oxidizers, strong alkalis	XAD-2; Toluene; GC/FID; III [#2529]
1199 29	1 ppm = 3.99 mg/m ³							
Furfuryl alcohol C ₅ H ₇ OCH ₂ OH 98-00-0 LU910000	2-Furylmethanol, 2-Hydroxymethylfuran	NIOSH/OSHA 10 ppm (40 mg/m ³) ST 15 ppm (60 mg/m ³) [skin]	250 ppm	Amber liquid with a faint, burning odor.	MW: 98.1 BP: 338°F Sol: Miscible FL.P: 149°F IP: ? Sp.Gr: 1.13 Class IIIA Combustible Liquid	VP(89°F): 1 mm FRZ: 6°F UEL: 16.3% LEL: 1.8%	Strong oxidizers & acids [Note: Contact with organic acids may lead to polymerization.]	Porapak-Q; Acetone; GC/FID; III [#2505]
2874 55	1 ppm = 4.08 mg/m ³							
Glycidol C ₂ H ₂ O ₂ 556-52-5 UB437500	2,3-Epoxy-1-propanol; Epoxypropyl alcohol; Hydroxymethyl ethylene oxide; 2-Hydroxymethyl oxiran; 3-Hydroxypropylene oxide	NIOSH/OSHA 25 ppm (75 mg/m ³)	500 ppm	Colorless liquid.	MW: 74.1 BP: 320°F (Decomposes) Sol: Miscible FL.P: 162°F IP: ? Sp.Gr: 1.12 Class IIIA Combustible Liquid	VP(77°F): 0.9 mm FRZ: -49°F UEL: ? LEL: ?	Strong oxidizers, nitrates	Char; THP; GC/FID; III [#1608]
	1 ppm = 3.08 mg/m ³							

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
<i>Clothing:</i>	<i>Any poss</i>	NIOSH/OSHA	Inh	Eye irrit, lac; nasal	Eye:	Resp sys, skin,
<i>Goggles:</i>	<i>Any poss</i>	30 ppm: SA/SCBA*	Ing	discharge; throat irrit,	Irr immed	Water flush immed
<i>Wash:</i>	<i>Immed contam</i>	§: SCBAF-PD,PP/SAF-PD,PP-ASCBA	Con	cough, dysp; nau; skin	Breath:	Resp support
<i>Change:</i>	<i>N.R.</i>	Escape: GMFOV/SCBAE		burns, derm	Swallow:	Medical attention immed
<i>Remove:</i>	<i>Immed non-imperv contam</i>					
<i>Provide:</i>	<i>Eyewash, quick drench</i>					
<i>Clothing:</i>	<i>Repeat</i>	OSHA	Inh	Irrit eyes, upper resp	Eye:	Eyes, resp sys,
<i>Goggles:</i>	<i>Reason prob</i>	20 ppm: CCROV*SA/SCBA*	Abs	sys; head; derm	Skin:	Water flush prompt
<i>Wash:</i>	<i>Prompt contam</i>	50 ppm: SA,CF/PAPROV*	Ing		Breath:	Resp support
<i>Change:</i>	<i>N.R.</i>	100 ppm: CCRFOV/GMFOV/SCBAF/ SAF/PAPRTOV*/SAT,CF*	Con		Swallow:	Medical attention immed
<i>Remove:</i>	<i>Prompt non-imperv contam</i>	250 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA				
		Escape: GMFOV/SCBAE				
<i>Clothing:</i>	<i>Reason prob</i>	NIOSH/OSHA	Inh	Dizz; nau, diarr; diuresis;	Eye:	Resp sys
<i>Goggles:</i>	<i>Reason prob</i>	100 ppm: PAPROV*/SCBA*/SA*/CCROV*	Abs	resp, body temperature,	Skin:	Water flush immed
<i>Wash:</i>	<i>Immed contam</i>	250 ppm: PAPRTOV*/SA,CF*/CCRFOV/ GMFOV/SCBAF/SAF	Ing	depres; vomit;	Breath:	Resp support
<i>Change:</i>	<i>N.R.</i>	§: SCBAF-PD,PP/SAF-PD,PP-ASCBA	Con	in animals; eye irrit, drow	Swallow:	Medical attention immed
<i>Remove:</i>	<i>Immed non-imperv contam</i>	Escape: GMFOV/SCBAE				
<i>Provide:</i>	<i>Quick drench</i>					
<i>Clothing:</i>	<i>Repeat</i>	NIOSH/OSHA	Inh	Irrit eyes, nose, throat,	Eye:	Eyes, skin, resp
<i>Goggles:</i>	<i>Reason prob</i>	250 ppm: SA/SCBA*	Ing	skin; narco	Skin:	Water wash prompt
<i>Wash:</i>	<i>Prompt contam</i>	500 ppm: SA,CF/SCBAF/SAF	Con		Breath:	Resp support
<i>Change:</i>	<i>N.R.</i>	§: SCBAF-PD,PP/SAF-PD,PP-ASCBA			Swallow:	Medical attention immed
<i>Remove:</i>	<i>Prompt non-imperv contam</i>	Escape: GMFOV/SCBAE				

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL F.P., IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Graphite (natural) C 7782-42-5 MD9659600	Black lead, Mineral carbon, Plumbago, Silver graphite, Sove black	NIOSH/OSHA 2.5 mg/m ³ (resp)	N.E.	Steel gray to black, greasy feeling, odorless solid.	MW: 12.0 BP: ? Sol: Insoluble F.P.: ? IP: NA	VP: 0 mm (approx) MLT: ? UEL: ? LEL: ?	Very strong oxidizers such as fluorine, chlorine trifluoride & potassium peroxide	Filter; none; Grav; III [#0500, Nuisance Dust (total)]
					Sp.Gr: 2.0-2.25 Combustible Solid			
Hafnium and compounds (as Hf) Hf 7440-58-6 (Metal) MG4600000 (Metal) 2545 40 (Metal powder, dry) 1326 32 (Metal powder, wet)	Metal: Cesium, Elemental hafnium Synonyms of other com- pounds vary depending upon the specific com- pound.	NIOSH/OSHA 0.5 mg/m ³	Unknown	Metal: Highly lustrous, ductile, grayish solid.	MW: 178.5 BP: 8310°F Sol: Insoluble F.P: NA IP: NA	VP: 0 mm (approx) MLT: 4041°F UEL: NA LEL: NA	Strong oxidizers, chlorine	Filter; Acid; PE5; II(5) [#S194]
					Sp.Gr: 13.31 (Metal) Metal: Explosive in powder form (either dry or with <25% water). Finely divided powder can be ignited by static electricity or EVEN SPONTANEOUSLY.			
Heptachlor C ₁₂ H ₂ Cl ₇ 76-44-8 PC0700000 2761 55	1,4,5,6,7,8,8-Heptachloro- 3a,4,7,7a-tetrahydro-4,7- methanoindene	NIOSH Ca See Appendix A 0.5 mg/m ³ [skin] OSHA 0.5 mg/m ³ [skin]	Ca [700 mg/m ³]	White to light tan crystals with a camphor-like odor. [insecticide]	MW: 373.4 BP: 293°F (Decomposes) Sol: Insoluble F.P: NA IP: ?	VP(77°F): 0.0003 mm MLT: 203°F UEL: NA LEL: NA	Iron, rust	Chrom-102; Toluene; GC/ECD; II(5) [#S287]
					Sp.Gr: 1.66 Noncombustible Solid, but may be dissolved in flammable liquids.			
n-Heptane CH ₃ (CH ₂) ₅ CH ₃ 142-82-5 MI7700000 1206 27	Heptane, normal-Heptane	NIOSH 85 ppm (350 mg/m ³) C 440 ppm (1800 mg/m ³) [15-min] OSHA 400 ppm (1600 mg/m ³) ST 500 ppm (2000 mg/m ³)	5000 ppm	Colorless liquid with a gasoline- like odor.	MW: 100.2 BP: 209°F Sol(60°F): 0.005% F.P: 25°F IP: 9.90 eV	VP(77°F): 40 mm FRZ: -131°F UEL: 6.7% LEL: 1.05%	Strong oxidizers	Char; CS; GC/FID; III [#1500; Hydro- carbons]
	1 ppm = 4.17 mg/m ³				Sp.Gr: 0.68 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH/OSHA 12.5 mg/m ³ ; D 25 mg/m ³ ; DXSQ/SA/SCBA 62.5 mg/m ³ ; PAPRD/SA-CF 125 mg/m ³ ; HIEF/PAPRTHIE/SCBA/ SAF/SAT-CF 1250 mg/m ³ ; SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Con	Cough, dysp, black sputum, pulm func impairment, lung fib	Eye: Irr immed Breath: Fresh air	Resp sys, CVS
Clothing: Any poss Goggles: Any poss Wash: Prompt contam/daily Change: After work if any poss contam Remove: Prompt non-imperv contam Provide: Eyewash, quick drench		NIOSH/OSHA 2.5 mg/m ³ ; DM 5 mg/m ³ ; DMXSQ/SA/SCBA 12.5 mg/m ³ ; PAPRDM*/SA-CF* 25 mg/m ³ ; HIEF/PAPRTHIE*/SCBAF/ SAF/SAT-CF* 250 mg/m ³ ; SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Ing Con	In animals: irrit eyes, skin, muc memb, liver damage	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Eyes, skin, muc memb
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Quick drench		NIOSH V: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	In animals: tremors, convuls; liver damage; [carc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	In animals: CNS, liver
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH 850 ppm; CCROV/SA/SCBA 1000 ppm; PAPROV/CCRFOV 2125 ppm; SA-CF 4250 ppm; GMFOV/SCBAF/SAF/SAT-CF 5000 ppm; SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	LI-head, gidd, stupor; no appetite, nau; derm; chemical pneu; unconsciousness	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Skin, resp sys, PNS

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, F.P., IP, Sp.Gr., flammability	VP, FRZ, UEL, LEL		
Hexachloroethane C_2Cl_6 67-72-1 K0425000	Carbon hexachloride, Perchloroethane	NIOSH Ca See Appendix A 1 ppm (10 mg/m ³) [skin] OSHA 1 ppm (10 mg/m ³) [skin]	Ca [300 ppm]	Colorless crystals with a camphor-like odor.	MW: 236.7 BP: Sublimes Sol(72°F): 0.005% F.P.: NA IP: 11.22 eV	VP: 0.2 mm MLT: 368°F (Sublimes) UEL: NA LEL: NA	Alkali; metals such as zinc, cadmium, aluminum, hot iron & mercury	Char; CS; GC/FID; IR [#1003, Halogenated Hydrocarbons]
9037 53					Sp.Gr: 2.09 Noncombustible Solid			
Hexachloronaphthalene $C_{10}H_2Cl_6$ 1335-87-1 QJ7350000	Halowax® 1014	NIOSH/OSHA 0.2 mg/m ³ [skin]	2 mg/m ³	White to light-yellow solid with an aromatic odor.	MW: 334.9 BP: 850-730°F Sol: Insoluble F.P.: NA IP: ?	VP: <1 mm MLT: 279°F UEL: NA LEL: NA	Strong oxidizers	Filter; Hexane; GC/ECD; IR2 [#5100]
					Sp.Gr: 1.78 Noncombustible Solid			
n-Hexane $CH_3(CH_2)_4CH_3$ 110-54-3 MN9275000	Hexane, Hexyl hydride, Normal-hexane	NIOSH/OSHA 50 ppm (180 mg/m ³)	5000 ppm	Colorless liquid with a gasoline-like odor.	MW: 86.2 BP: 156°F Sol: 0.002% F.P.: -7°F IP: 10.18 eV	VP(77°F): 150 mm FRZ: -219°F UEL: 7.5% LEL: 1.1%	Strong oxidizers	Char; CS; GC/FID; IR [#1500, Hydrocarbons]
1208 27	1 ppm = 3.58 mg/m ³				Sp.Gr: 0.66 Class IB Flammable Liquid			
2-Hexanone $CH_3CO(CH_2)_3CH_3$ 591-78-6 MP1400000	Butyl methyl ketone, MOK, Methyl butyl ketone, Methyl n-butyl ketone	NIOSH 1 ppm (4 mg/m ³) OSHA 5 ppm (20 mg/m ³)	5000 ppm	Colorless liquid with an acetone-like odor.	MW: 100.2 BP: 262°F Sol: 2% F.P.: 77°F IP: 9.34 eV	VP(77°F): 4 mm FRZ: -71°F UEL: 8% LEL: ?	Strong oxidizers	Char; CS; GC/FID; IR [#1300, Ketones]
	1 ppm = 4.17 mg/m ³				Sp.Gr: 0.81 Class IC Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: N.R. Wash: Prompt contam/daily Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH v: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes; [carc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Eyes
Clothing: Any poss molt/Repeat liq sol./Reason prob fumes Goggles: Any poss molt/Reason prob liq Wash: Prompt contam/daily Change: After work if reason prob contam Remove: Immed wet molt/Prompt non-imperv contam liq	NIOSH/OSHA 2 mg/m ³ : SA ⁺ /SCBA* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Acne-form derm, nau, conf, jaun, coma	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Liver, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 500 ppm: SA ⁺ /SCBA* 1250 ppm: SA:CF* 2500 ppm: SAT:CF ⁺ /SCBAF/SAF 5000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	LI-head; nau, head; numb extremities, musc weak; irrit eyes, nose; derm; chemical pneu; gidd	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Skin, eyes, resp sys
Clothing: Reason prob Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH 10 ppm: SA/SCBA 25 ppm: SA:CF 50 ppm: SCBAF/SAF/SAT:CF 2000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose; peri neur: weak, pares; derm; head; drow	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	CNS, skin, resp sys

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Hexone $\text{CH}_3\text{COCH}_2\text{CH}(\text{CH}_3)_2$ 108-10-1 SA9275000	Isobutyl methyl ketone, Methyl isobutyl ketone, 4-Methyl 2-pentanone, MIBK	NIOSH/OSHA 50 ppm (205 mg/m ³) ST 75 ppm (300 mg/m ³)	3000 ppm	Colorless liquid with a pleasant odor.	MW: 100.2 BP: 242°F Sol: 2% FLP: 64°F IP: 9.30 eV	VP: 16 mm FRZ: -120°F UEL(200°F): 8.0% LEL(200°F): 1.2%	Strong oxidizers, potassium tert-butoxide	Char; CS ₂ ; GC/FID; III [#1300, Ketones I]
1245 26	1 ppm = 4.17 mg/m ³				Sp.Gr: 0.80 Class IB Flammable Liquid			
sec-Hexyl acetate $\text{C}_8\text{H}_{16}\text{O}_2$ 108-84-9 SA7525000	1,3-Dimethylbutyl acetate; Methylisoamyl acetate [$\text{CH}_3\text{COOCH}(\text{CH}_3)-\text{CH}_2\text{CH}(\text{CH}_3)_2$]	NIOSH/OSHA 50 ppm (300 mg/m ³)	4000 ppm	Colorless liquid with a mild, pleasant, fruity odor.	MW: 144.2 BP: 297°F Sol: 0.08% FLP: 113°F IP: ?	VP: 3 mm FRZ: -83°F UEL: ? LEL: ?	Nitrates; strong oxidizers, alkalis & acids	Char; CS ₂ ; GC/FID; III [#1450, Esters I]
1233 26	1 ppm = 5.99 mg/m ³				Sp.Gr: 0.86 Class II Combustible Liquid			
Hydrazine N_2H_4 302-01-2 MU7175000	Diamine, Hydrazine (anhydrous), Hydrazine base	NIOSH Ca See Appendix A C 0.03 ppm (0.04 mg/m ³) [2-hr] OSHA 0.1 ppm (0.1 mg/m ³) [skin]	Ca [80 ppm] ACGIH A2	Colorless liquid with an ammonia-like odor. [Note: A solid below 38°F.]	MW: 32.1 BP: 238°F Sol: Miscible FLP: 99°F IP: 8.93 eV	VP: 10 mm FRZ: 36°F UEL: 98% LEL: 2.9%	Oxidizers, hydrogen peroxide, nitric acid, metallic oxides, acids [Note: Can ignite SPONTANEOUSLY on contact with oxidizers or porous materials such as earth, wood, and cloth.]	Bub; Reagent; Vis; III [#3503]
2030 59 (<64% soln) 2029 28 (>64% soln)	1 ppm = 1.33 mg/m ³				Sp.Gr: 1.01 Class IC Flammable Liquid			
Hydrogen bromide HBr 10035-10-6 MW3850000	Anhydrous hydrogen bromide; Aqueous hydrogen bromide (i.e., Hydrobromic acid)	NIOSH/OSHA C 3 ppm (10 mg/m ³)	50 ppm	Colorless gas with a sharp, irritating odor. [Note: Often used in an aqueous solution.]	MW: 80.9 BP: -88°F Sol: 49% FLP: NA IP: 11.62 eV	VP: >1 atm FRZ: -124°F UEL: NA LEL: NA	Strong oxidizers, strong caustics, metals, moisture [Note: Hydrobromic acid is highly corrosive to metals.]	Si gel; NaHCO_3 / Na_2CO_3 ; IC; III [#7903, Inorganic Acids]
1048 15	1 ppm = 3.36 mg/m ³				Nonflammable Gas			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 500 ppm: CCR0V*/SA*/SCBA* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA,CF* 2500 ppm: GMFOV/SCBAF/SAF/SAT:CF* 3000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, muc memb; head; narco, coma; derm	Eye: Skin: Breath: Swallow: Irr immed Water flush prompt Resp support Medical attention immed	Resp sys, eyes, skin, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet		NIOSH/OSHA 500 ppm: CCROV*/SA*/SCBA* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA,CF* 2500 ppm: GMFOV/SCBAF/SAF 4000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Head: in animals: irrit eyes, nose, throat; narco	Eye: Skin: Breath: Swallow: Irr immed Water flush prompt Resp support Medical attention immed	CNS, eyes
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench		NIOSH v: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; temporary blindness; dizz, nau; derm; burns skin, eyes; [narco]; in animals: bron, pulm edema; liver, kidney damage; convuls	Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed	CNS, resp sys, skin, eyes
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench		NIOSH/OSHA 50 ppm: SA,CF*/PAPRAG*/GMFAG/ SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFAG/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; skin, eye burns	Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed	Resp sys, eyes, skin

Hydrogen bromide

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Hydrogen chloride HCl 7647-01-0 MW4025000	Anhydrous hydrogen chloride; Aqueous hydrogen chloride (i.e., Hydrochloric acid, Muriatic acid)	NIOSH/OSHA C 5 ppm (7 mg/m ³)	100 ppm	Colorless to slightly yellow gas with a pungent, irritating odor. [Note: Often used in an aqueous solution.]	MW: 36.5 BP: -121°F Sol: Miscible FL.P: NA IP: 12.74 eV	VP: >1 atm FRZ: -174°F UEL: NA LEL: NA	Metals, hydroxides, amines, alkalis [Note: Hydrochloric acid is highly corrosive to most metals.]	Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids]
1050 15 (anhydrous)	1 ppm = 1.52 mg/m ³				Nonflammable Gas			
Hydrogen cyanide HCN 74-90-8 MW6825000	Formonitrile, Hydrocyanic acid, Prussic acid	NIOSH/OSHA ST 4.7 ppm (5 mg/m ³) [skin]	50 ppm	Colorless or pale blue liquid or gas (above 78°F) with a bitter, almond-like odor.	MW: 27.0 BP: 78°F Sol: Miscible FL.P: 0°F IP: 13.60 eV	VP: 630 mm FRZ: 8°F UEL: 40.0% LEL: 5.6%	Amines, oxidizers, acids, sodium hydroxide, calcium hydroxide, sodium carbonate, water, caustics, ammonia [Note: Can polymerize at 122-140°F.]	Filter/Stub; KOH; ISE; III [#7904, Cyanides] [Note: Also Soda lime; Water; Vis; #6010.]
1051 13 1613 57 (5% acid)	1 ppm = 1.12 mg/m ³				Sp.Gr: 0.69 Class IA Flammable Liquid			
Hydrogen fluoride (as F) HF 7664-39-3 MW7875000	Anhydrous hydrogen fluoride; Aqueous hydrogen fluoride (i.e., Hydrofluoric acid); HF-A	NIOSH 3 ppm (2.5 mg/m ³) C 6 ppm 5 mg/m ³ [15-min]	30 ppm	Colorless gas or fuming liquid (below 67°F) with a strong, irritating odor. [Note: Shipped in cylinders.]	MW: 20.0 BP: 67°F Sol: Miscible FL.P: NA IP: 15.98 eV	VP: >1 atm FRZ: -118°F UEL: NA LEL: NA	Metals, water or steam [Note: Corrosive to metals. Will attack glass and concrete.]	Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids]
1052 15 (anhydrous)	1 ppm = 0.83 mg/m ³	OSHA 3 ppm ST 6 ppm			Sp.Gr: 1.00 (Liquid at 67°F) Nonflammable Gas			
Hydrogen peroxide H ₂ O ₂ 7722-84-1 MX0900000	High-strength hydrogen peroxide, Hydrogen dioxide, Hydrogen peroxide (aqueous), Hydroperoxide, Peroxiide	NIOSH/OSHA 1 ppm (1.4 mg/m ³)	75 ppm	Colorless liquid with a slightly sharp odor. [Note: The pure compound is a crystalline solid below 12°F. Often used in an aqueous solution.]	MW: 34.0 BP: 286°F Sol: Miscible FL.P: NA IP: 10.54 eV	VP(86°F): 5 mm FRZ: 12°F UEL: NA LEL: NA	Oxidizable materials, iron, copper, brass, bronze, chromium, zinc, lead, manganese, silver [Note: Contact with combustible material may result in SPONTANEOUS combustion.]	None available
2984 60 (8-20% soln) 2014 45 (20-52% soln) 2015 47 (>52% soln)	1 ppm = 1.41 mg/m ³				Sp.Gr: 1.39 Noncombustible Liquid, but a powerful oxidizer.			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Any poss pH <3/Repeat pH >3 Goggles: Any poss Wash: Immed contam pH <3/ Prompt wet pH >3 Change: N.R. Remove: Immed non-imperv contam pH <3/Prompt non-imperv wet pH <3: Eyewash, quick drench Provide:	NIOSH/OSHA 50 ppm: SA*/SCBA*/CCRS* 100 ppm: SA:CF*/SCBAF*/SAF/GMFS/CCRFs/PAPRS* ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFAG/SCBAE	Inh Ing Con	Inflam nose, throat, lar; cough; burns throat, choking; burns eyes, skin; dermat; in animals: lar spasm; pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench	NIOSH/OSHA 47 ppm: SA/SCBA 50 ppm: SA:CF/SCBAF/SAF ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Asphy and death at high levels; weak, head, conf; nau, vomit; incr rate and depth of respiration or respiration slow and gasping	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	CNS, CVS, liver, kidneys
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 30 ppm: SA*/SCBA*/PAPRS*/CCRS*/GMFS ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; pulm edema; skin, eye burns; nasal congestion; bron	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Eyes, resp sys, skin
Clothing: Any poss Goggles: Any poss Wash: Prompt contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 10 ppm: SA*/SCBA* 25 ppm: SA:CF* 50 ppm: SCBAF/SAF 75 ppm: SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; corneal ulcer; erythema, vesicles on skin; bleaching hair	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Eyes, skin, resp sys

Hydrogen peroxide

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Hydrogen selenide (as Se) H ₂ Se 7783-07-5 MX1050000	Selenium dihydride, Selenium hydride	NIOSH/OSHA 0.05 ppm (0.2 mg/m ³)	2 ppm	Colorless gas with an odor resembling decayed horse radish.	MW: 81.0 BP: -42°F Sol:(73°F): 0.9% FLP: NA (Gas) IP: 9.88 eV	VP: >1 atm FRZ: -87°F UEL: ? LEL: ?	Strong oxidizers, acids, water, halogenated hydrocarbons	None available
2202 18	1 ppm = 3.37 mg/m ³				Flammable Gas			
Hydrogen sulfide H ₂ S 7783-06-4 MX1225000	Hydrosulfuric acid, Sewer gas, Sulfuretted hydrogen	NIOSH C 10 ppm (15 mg/m ³) [10-min] OSHA 10 ppm (14 mg/m ³) ST 15 ppm (21 mg/m ³)	300 ppm	Colorless gas with a strong odor of rotten eggs. [Note: Sense of smell becomes rapidly fatigued & can NOT be relied upon to warn of the continuous presence of H ₂ S. Shipped as a liquefied compressed gas.]	MW: 34.1 BP: -77°F Sol: 0.4% FLP: NA (Gas) IP: 10.46 eV	VP: >1 atm FRZ: -122°F UEL: 44.0% LEL: 4.0%	Strong oxidizers, strong nitric acid, metals	Dry tube/ Mol-sieve; Thermal desorp; GC/FID; II(6) [PACAM #296]
1053 13	1 ppm = 1.42 mg/m ³				Flammable Gas			
Hydroquinone C ₆ H ₄ (OH) ₂ 123-31-9 MX3500000	1,4-Benzenediol; Dihydroxybenzene; 1,4-Dihydroxybenzene; Quinol	NIOSH C 2 mg/m ³ [15-min] OSHA 2 mg/m ³	Unknown	Light tan, light gray, or colorless crystals.	MW: 110.1 BP: 545°F Sol: 7% FLP: 329°F (Molten) IP: 7.95 eV	VP: 0.00001 mm MLT: 338°F UEL: ? LEL: ?	Strong oxidizers, alkalis	Filter: CH ₃ COOH; HPLC/UVD; III [#5004]
2662 53					Sp.Gr: 1.33 Combustible Solid, dust cloud may explode if ignited in an enclosed area.			
Iodine I ₂ 7553-56-2 NN1575000	Iodine crystals, Molecular iodine	NIOSH/OSHA C 0.1 ppm (1 mg/m ³)	10 ppm	Violet solid with a sharp, characteristic odor.	MW: 253.8 BP: 385°F Sol: 0.01% FLP: NA IP: 9.31 eV	VP(77°F): 0.3 mm MLT: 236°F UEL: NA LEL: NA	Ammonia, acetylene, acetaldehyde, powdered aluminum, active metals, liquid chlorine	Char*: Na ₂ CO ₃ ; IC; III [#6005]
					Sp.Gr: 4.93 Noncombustible	Solid		

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH/OSHA 0.5 ppm: SA/SCBA 1.25 ppm: SA/CF* 2 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Con	Irrit eyes, nose, throat; nau, vomit, diarr; metallic taste, garlic breath; dizziness, lass, fig; in animals: pneumitis, liver damage	Breath: Resp support	Resp sys, eyes
Clothing: Prevent skin freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 100 ppm: SA*/SCBA* 250 ppm: SA/CF* 300 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Apnea, coma, convuls; irrit eyes: conj, pain, lac, photo, corneal vesic; irrit resp sys; dizz; head; fig, irrt; insom; GI dist	Eye: Irr immed Skin: Water flush Breath: Resp support	Resp sys, eyes
Clothing: Repeat Goggles: Any poss >7%/Reason prob <7% Wash: Prompt contam Change: Alter work if reason prob contam Remove: Prompt non-imperv contam Provide: >7%: Eyewash		NIOSH/OSHA 50 mg/m ³ : PAPRD† 100 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIEF/SAT,CF† 200 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit eyes: conj; kera; CNS excitement; colored urine, nau, dizz, suffocation, rapid breath; musc twitch, delirium; collapse	Eye: Irr immed (15 min) Skin: Water flush Breath: Fresh air Swallow: Medical attention immed	Eyes, resp sys, skin, CNS
Clothing: Any poss >7%/Repeat <7% Goggles: Any poss >7%/Reason prob <7% Wash: Immed contam >7%/Prompt contam <7% Change: N.R. Remove: Immed non-imperv contam Provide: >7%: Eyewash, quick drench		NIOSH/OSHA 1 ppm: SA*/SCBA* 2.5 ppm: SA/CF* 5 ppm: SCBAF/SAF 10 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFAGHIE/SCBAE	Inh Ing Con	Irrit eyes, nose; lac; head; tight chest; skin burns, rash; cutaneous hypersensitivity	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes, skin, CNS, CVS

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Iron oxide dust and fume (as Fe) Fe ₂ O ₃ 1309-37-1 NO7525000	Ferric oxide	NIOSH 5 mg/m ³ OSHA 10 mg/m ³	N.E.	Reddish-brown solid. [Note: Exposure to fume may occur during the arc-welding of iron.]	MW: 159.7 BP: ? Sol: Insoluble F.L.P: NA IP: NA	VP: 0 mm (approx) MLT: 2664°F UEL: NA LEL: NA	Calcium hypochlorite	Filter; none; XRF; III [#7200, Welding & Brazing Fume]
1376 37					Sp.Gr: 5.24 Noncombustible Solid			
Isoamyl acetate CH ₃ COOCH ₂ -CH ₂ CH(CH ₃) ₂ 123-92-2 NS9800000	Banana oil, isopentyl acetate, 3-Methyl-1-butanol acetate, 3-Methylbutyl ester of acetic acid, 3-Methylbutyl ethanoate	NIOSH/OSHA 100 ppm (525 mg/m ³)	3000 ppm	Colorless liquid with a banana-like odor.	MW: 130.2 BP: 288°F Sol: 0.3% F.L.P: 77°F IP: ?	VP: 4 mm FRZ: -109°F UEL: 7.5% LEL(212°F): 1.0%	Nitrates; strong oxidizers, alkalis & acids	Char; CS ₂ ; GC/FID; III [#1450, Esters I]
	1 ppm = 5.41 mg/m ³				Sp.Gr: 0.87 Class IC Flammable Liquid			
Isoamyl alcohol (primary and secondary) 1: (CH ₃) ₂ CHCH ₂ CH ₂ OH 2: (CH ₃) ₂ CHCH(OH)CH ₃ 1: 123-51-3 2: 528-75-4 1: EL5425000 1105 26	1(primary): Fermentation amyl alcohol, Fusel oil, Isobutyl carbinol, isopentyl alcohol, 3-Methyl-1-butanol 2(secondary): 3-Methyl-2-butanol	NIOSH/OSHA 100 ppm (360 mg/m ³) ST 125 ppm (450 mg/m ³)	10,000 ppm	Colorless liquids with a disagreeable odor.	MW: 88.2 BP: 270/234°F Sol(57°F): 2%/? F.L.P: 109/95°F(oc) IP: 2/7 Sp.Gr: 0.81 (at 57°F)0.82 primary: Class II Combustible Liquid secondary: Class IC Flammable Liquid	VP: 28/1 mm FRZ: -179°F/? UEL(212°F): 9.0%/? LEL: 1.2%/?	Strong oxidizers	Char; 2-Propanol/CS ₂ ; GC/FID; III [#1402, Alcohols III]
Isobutyl acetate CH ₃ COOCH ₂ CH(CH ₃) ₂ 110-19-0 A14025000	Isobutyl ester of acetic acid, 2-Methylpropyl acetate, 2-Methylpropyl ester of acetic acid, beta-Methylpropyl ethanoate	NIOSH/OSHA 150 ppm (700 mg/m ³)	7500 ppm	Colorless liquid with a fruity, floral odor.	MW: 116.2 BP: 243°F Sol(77°F): 0.6% F.L.P: 64°F IP: 9.97 eV	VP: 13 mm FRZ: -145°F UEL: 10.5% LEL: 1.3%	Nitrates; strong oxidizers, alkalis & acids	Char; CS ₂ ; GC/FID; III [#1450, Esters I]
1213 26	1 ppm = 4.83 mg/m ³				Sp.Gr: 0.87 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Route	Symptoms (See Table 5)	Health hazards	First aid (See Table 6)	Target organs (See Table 5)
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH 50 mg/m ³ , DMF _u /SA/SCBA 125 mg/m ³ , PAPRDMF _u /SA,CF 250 mg/m ³ , HIEF/PAPRTHIE/SCBAF/ SAF/SAT,CF 5000 mg/m ³ , SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh	Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis	Breath:	Resp support	Resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: CCRQV/PAPROV/SA/SCBA 2500 ppm: SA,CF 3000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; narco; derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet		NIOSH/OSHA 1000 ppm: CCRFOV/PAPROV ⁴ 2500 ppm: SA,CF ⁴ 5000 ppm: SCBAF/SAF/GMFOV 10,000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; narco; head, dizz; dysp, nau, vomit, diarr; skin cracking	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV ⁴ /CCRFOV 3750 ppm: SA,CF ⁴ 7500 ppm: SCBAF/SAF/GMFOV §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Head; drow; irrit eyes, upper resp sys, skin, anes	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Skin, eyes, resp sys

Isobutyl acetate

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Isobutyl alcohol (CH ₃) ₂ CHCH ₂ OH 78-83-1 NP9625000	IBA, Isobutanol, Isopropylcarbinol, 2-Methyl-1-propanol	NIOSH/OSHA 50 ppm (150 mg/m ³)	8000 ppm	Colorless, oily liquid with a sweet, musty odor.	MW: 74.1 BP: 227°F Sol: 10% FLP: 82°F IP: 10.12 eV	VP: 9 mm FRZ: -162°F UEL(202°F): 10.6% LEL(123°F): 1.7%	Strong oxidizers	Char; 2-Propanol/ CS ₂ ; GC/FID; III [#1401, Alcohols I]
1212 26	1 ppm = 3.08 mg/m ³				Sp.Gr: 0.80 Class IC Flammable Liquid			
Isophorone C ₉ H ₁₆ O 78-59-1 GW7700000	Isoacetophorone; 3,5,5-Trimethyl-2-cyclohexenone; 3,5,5-Trimethyl-2-cyclohexen-1-one	NIOSH/OSHA 4 ppm (23 mg/m ³)	800 ppm	Colorless to white liquid with a peppermint-like odor.	MW: 138.2 BP: 419°F Sol: 1% FLP: 184°F IP: 9.07 eV	VP(77°F): 0.4 mm FRZ: 17°F UEL: 3.8% LEL: 0.8%	Strong oxidizers	Char(per); CS ₂ ; GC/FID; III [#2508]
	1 ppm = 5.74 mg/m ³				Sp.Gr: 0.92 Class IIIA Combustible Liquid			
Isopropyl acetate CH ₃ COOCH(CH ₃) ₂ 108-21-4 AI4930000	Isopropyl ester of acetic acid, 1-Methylethyl ester of acetic acid, 2-Propyl acetate	NIOSH See Appendix D OSHA 250 ppm (950 mg/m ³) ST 310 ppm (1185 mg/m ³)	16,000 ppm	Colorless liquid with a fruity odor.	MW: 102.2 BP: 194°F Sol: 3% FLP: 38°F IP: 9.95 eV	VP: 42 mm FRZ: -92°F UEL: 8% LEL(100°F): 1.8%	Nitrates; strong oxidizers, alkalis & acids	Char; CS ₂ ; GC/FID; III [#550]
1220 26	1 ppm = 4.25 mg/m ³				Sp.Gr: 0.87 Class IB Flammable Liquid			
Isopropyl alcohol (CH ₃) ₂ CHOH 67-63-0 NT8050000	Dimethyl carbinol, IPA, Isopropanol, 2-Propanol, sec-Propyl alcohol, Rubbing alcohol	NIOSH/OSHA 400 ppm (980 mg/m ³) ST 500 ppm (1225 mg/m ³)	12,000 ppm	Colorless liquid with the odor of rubbing alcohol.	MW: 60.1 BP: 181°F Sol: Miscible FLP: 53°F IP: 10.10 eV	VP: 33 mm FRZ: -127°F UEL(202°F): 12.7% LEL: 2.0%	Strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids, isocyanates	Char; 2-Butanol/ CS ₂ ; GC/FID; III [#1400, Alcohols I]
1219 26	1 ppm = 2.50 mg/m ³				Sp.Gr: 0.79 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)		Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 500 ppm: SA*/SCBA*/CCRVO* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA,CF* 2500 ppm: GMFOV/SCBAF/SAF 8000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, throat; head, drow; skin irrit, cracking	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Any poss Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet Provide: Eyewash		NIOSH/OSHA 40 ppm: SA*/SCBA*/CCRVO* 100 ppm: SA,CF*/PAPROV* 200 ppm: GMFOV/SCBAF/SAF/ PAPRTOV*/SAT,CF* 800 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; narco; dermat	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		OSHA 6250 ppm: SA,CF† 12,500 ppm: SCBAF/SAF 16,000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, skin; dermat; narco	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV*/CCRFOV 10,000 ppm: SA,CF† 12,000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Mild irrit eyes, nose, throat; drow, dizz, head; dry cracking skin	Eye: Skin: Breath: Swallow:	Irr immed Water flush Resp support Medical attention immed	Eyes, skin, resp sys

Isopropyl alcohol

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Isopropylamine (CH ₃) ₂ CHNH ₂ 75-31-0 NT8400000	2-Aminopropane, Monoisopropylamine, 2-Propylamine, sec-Propylamine	NIOSH See Appendix D OSHA 5 ppm (12 mg/m ³) ST 10 ppm (24 mg/m ³)	4000 ppm	Colorless liquid with an ammonia-like odor. [Note: A gas above 91°F.]	MW: 59.1 BP: 91°F Sol: Miscible FLP(oc): -35°F IP: 8.72 eV	VP: 460 mm FRZ: -150°F UEL: ? LEL: ?	Strong acids, strong oxidizers	Bub; NaOH; GC/FID; II(3) [#5147]
1221 68	1 ppm = 2.46 mg/m ³				Sp.Gr: 0.69 Class IA Flammable Liquid			
Isopropyl ether (CH ₃) ₂ CHOCH(CH ₃) ₂ 108-20-3 TZ5425000	Diisopropyl ether, Diisopropyl oxide, 2-Isopropoxy propane	NIOSH/OSHA 500 ppm (2100 mg/m ³) ACGIH 250 ppm (1050 mg/m ³) ST 310 ppm (1320 mg/m ³)	10,000 ppm	Colorless liquid with a sharp, sweet, ether-like odor.	MW: 102.2 BP: 154°F Sol: 0.2% FLP: -18°F IP: 9.20 eV	VP: 119 mm FRZ: -78°F UEL: 7.9% LEL: 1.4%	Strong oxidizers, acids [Note: Unstable peroxides may form upon long contact of isopropyl ether with air.]	Char; CS ₂ ; GC/FID; II(3) [#S368]
1159 26	1 ppm = 4.25 mg/m ³				Sp.Gr: 0.73 Class IB Flammable Liquid			
Isopropyl glycidyl ether C ₆ H ₁₂ O ₂ 4016-14-2 TZ3500000	1,2-Epoxy-3-Isopropoxy-propane; IGE; Isopropoxymethyl oxirane	NIOSH C 50 ppm (240 mg/m ³) [15-min] OSHA 50 ppm (240 mg/m ³) ST 75 ppm (360 mg/m ³)	1000 ppm	Colorless liquid.	MW: 116.2 BP: 279°F Sol: 19% FLP: 92°F IP: ?	VP(77°F): 9 mm FRZ: ? UEL: ? LEL: ?	Strong oxidizers, strong caustics	Char; CS ₂ ; GC/FID; II(2) [#577]
1 ppm = 4.83 mg/m ³					Sp.Gr: 0.92 Class IC Flammable Liquid			
Ketene CH ₂ =CO 463-51-4 OA7700000	Carbomethene, Etheneone, Keto-ethylene	NIOSH/OSHA 0.5 ppm (0.9 mg/m ³) ST 1.5 ppm (3 mg/m ³)	Unknown	Colorless gas with a penetrating odor.	MW: 42.0 BP: -69°F Sol: Decomposes FLP: NA (Gas) IP: 9.61 eV	VP: >1 atm FRZ: -238°F UEL: ? LEL: ?	Water (decomposes), alcohol, ammonia [Note: Readily polymerizes.]	Bub; FeCl ₃ ; Vis; II(2) [#592]
1 ppm = 1.75 mg/m ³					Flammable Gas			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Reason prob Goggles: Any poss Wash: Immed wet Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench	OSHA 125 ppm: SA,CF ⁴ /PAPRS ⁵ 250 ppm: CCRFS/GMFS/SCBAF/SAF/ PAPRTS ¹ 4000 ppm: SAF,PD,PP §: SCBAF,PD,PP/SAF,PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Abs Inh Con	Irrit eyes, nose, throat, skin; pulm edema; vis dist; skin, eye burns; dermat	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, eyes
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet	ACGIH 1000 ppm: PAPROV ² /CCROV ⁴ 2500 ppm: SA ¹ /SCBA ¹ 6250 ppm: SA,CF ⁴ 10,000 ppm: SCBAF/SAF/GMFOV §: SCBAF,PD,PP/SAF,PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose; resp discomfort; dermat; in animals: drow, dizz, unconsciousness, narco	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Resp sys, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: SA,CF ⁴ §: SCBAF,PD,PP/SAF,PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, upper resp sys, skin; skin sens	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 5 ppm: SA ¹ /SCBA ¹ 12.5 ppm: SA,CF ⁴ 25 ppm: SCBAF/SAF §: SCBAF,PD,PP/SAF,PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Con	Irrit eyes, nose, throat, lungs; pulm edema	Breath: Resp support	Resp sys, eyes, skin

Ketene

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Lead (as Pb) Pb 7439-92-1 (Metal) CF7525000 (Metal)	Metal: Lead metal, Plumbum [Note: OSHA considers "Lead" to mean metallic Pb, all inorganic Pb cmpds (Pb oxides and Pb salts), and a class of organic Pb cmpds called soaps. All other organic Pb cmpds are excluded from this definition.]	NIOSH 0.100 mg/m ³ [Air concentration to be maintained so that worker blood lead remains <0.060 mg/100 g of whole blood.] OSHA [1910.1025] 0.050 mg/m ³	700 mg/m ³	Metal: A heavy, ductile, soft gray solid.	MW: 207.2 BP: 3164°F Sol: insoluble F.L.P.: NA IP: NA	VP: 0 mm (approx) MLT: 621°F UEL: NA LEL: NA	Strong oxidizers, hydrogen peroxide, acids	Filter; HNO ₃ /H ₂ O ₂ ; AA; III [#7082]
2291 53(soluble cmpds)					Sp.Gr: 11.34 (Metal) Metal: Noncombustible Solid in bulk form.			
Lindane C ₆ H ₆ Cl ₆ 58-89-9 GV4900000	BHC; gamma-Hexachlorocyclohexane; HCH; 1,2,3,4,5,6-Hexachlorocyclohexane	NIOSH/OSHA 0.5 mg/m ³ [skin]	1000 mg/m ³	White to yellow, crystalline powder with a slight musty odor. [pesticide]	MW: 290.8 BP: 614°F Sol: 0.001% F.L.P.: NA IP: ?	VP: 0.00001 mm MLT: 235°F UEL: NA LEL: NA	Corrosive to metals	Filter/Buf; Isocyanate; GC/ECOD; III [#5502]
2761 55					Sp.Gr: 1.85 Noncombustible Solid, but may be dissolved in flammable liquids.			
Lithium hydride LiH 7580-67-8 OJ8300000	Lithium monohydride	NIOSH/OSHA 0.025 mg/m ³	55 mg/m ³	Odorless, off-white to gray translucent, crystalline mass or white powder.	MW: 7.95 BP: Decomposes Sol: Reacts F.L.P.: ? IP: NA	VP: 0 mm (approx) MLT: 1256°F UEL: ? LEL: ?	Strong oxidizers, halogenated hydrocarbons, acids, water [Note: May ignite SPONTANEOUSLY in air and may reignite after fire is extinguished. Reacts with water to form hydrogen & lithium hydroxide.]	None available
1414 40 2805 40 (fused solid)				Sp.Gr: 0.78 Combustible Solid, but can form airborne dust clouds which may explode on contact with flame, heat, or oxidizers.				
L.P.G. C ₃ H ₈ /C ₄ H ₁₀ /C ₃ H ₆ /C ₄ H ₈ 68476-85-7 SE7545000	Bottled gas, Compressed petroleum gas, Liquefied hydrocarbon gas, Liquefied petroleum gas, LPG	NIOSH/OSHA 1000 ppm (1800 mg/m ³)	19,000 ppm [LEL]	Colorless, noncorrosive, odorless gas when pure. [Note: A foul-smelling odorant is usually added. A fuel mixture of propane, propylene, butanes & butylenes. Shipped as a liquefied compressed gas.]	MW: 42 to 58 BP: >44°F Sol: ? F.L.P.: NA (Gas) IP: 10.95 eV	VP: >1 atm FRZ: ? UEL: 9.5% (Propane) 8.4% (Butane) LEL: 2.1% (Propane) 1.8% (Butane)	Strong oxidizers, chlorine dioxide	Combustible gas meter; none; none; II(2) [#593]
1075 22					Flammable Gas			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Goggles: Wash: Change: Remove:	Repeat Reason prob Daily N.R. Prompt non-imperv contam	OSHA 0.5 mg/m ³ : SA/IE/SCBA 1.25 mg/m ³ : PAP/RIE/SA/CF 2.5 mg/m ³ : HIEF/PAP/RIE/SCBAF/ SAF/SAT/CF 50 mg/m ³ : SA-PD,PP 100 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Weak, lass, inSom; facial pallor; pal eye, anor, low-wgt, mainut; constip; abdom pain, colic; anemia; gingival lead line; tremor; para wrist, ankles; encephalopathy; nephropathy; irrit eyes; hypotension	Eye: Skin: Breath: Swallow:	Irr immed Soap flush prompt Resp support Medical attention immed	GI tract, CNS, kidneys, blood, gingival tissue
Clothing: Goggles: Wash: Change: Remove: Provide:	Reason prob N.R. Immed contam After work if reason prob contam Immed non-imperv contam liq Quick drench	NIOSH/OSHA 5 mg/m ³ : CCR/ROVDMFu/SA/SCBA 12.5 mg/m ³ : PAP/ROVDMFu/SA/CF* 25 mg/m ³ : CCRFOVHIE/SCBAF/SAF/ GMFOVHIE/PAP/TOVHIE* 1000 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; head; nau; clonic convuls; resp difficulty; cyan; aplastic anemia; skin irrit; musc spasm; in animals: liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, CNS, blood, liver, kidneys, skin
Clothing: Goggles: Wash: Change: Remove: Provide:	Any poss sol/Repeat air >0.1 mg/m ³ Any poss Brush/immed contam After work if any poss contam Immed contam Eyewash>0.5 mg/m ³ : quick drench	NIOSH/OSHA 0.25 mg/m ³ : SA/SCBA/IE 0.625 mg/m ³ : SA/CF*/PAP/RIE* 1.25 mg/m ³ : HIEF/SCBAF/SAF/ PAP/RIE* 50 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Burns eyes, skin; burns mouth, esophagus (if ingested); nau; musc twitches; mental conf; blurred vision	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Goggles: Wash: Change: Remove:	Prevent skin freezing Reason prob N.R. N.R. Immed wet (flamm)	NIOSH/OSHA 10,000 ppm: SA/SCBA 19,000 ppm: SA/CF/SCBAF/SAF/SAT/CF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: SCBAE	Inh Con	Li-head, drow	Eye: Skin: Breath:	Irr immed Water flush immed Resp support	Resp sys, CNS

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Magnesium oxide fume MgO 1309-48-4 OM3850000	Magnesia fume	NIOSH See Appendix D OSHA 10 mg/m ³	N.E.	Finely divided white particulate dispersed in air. [Note: Exposure may occur when magnesium is burned, thermally cut, or welded upon.]	MW: 40.3 BP: 6512°F Sol(86°F): 0.009% FLP: NA IP: NA Sp.Gr: 3.58 Noncombustible Solid	VP: 0 mm (approx) MLT: 5072°F UEL: NA LEL: NA	Chlorine trifluoride, phosphorus pentachloride	Filter; Acid; ICP; III [#7300, Elements]
Malathion C ₁₀ H ₁₆ O ₄ P ₂ S ₂ 121-75-5 WM8400000 2783 55	S-(1,2-bis(ethoxycarbonyl)ethyl)(0,0-dimethylphosphorodithioate); Diethyl (dimethoxyphosphinothioylthio) succinate	NIOSH/OSHA 10 mg/m ³ [skin]	5000 mg/m ³	Deep brown to yellow liquid with a garlic-like odor. [Note: A solid below 37°F.] [insecticide]	MW: 330.4 BP: 140°F (Decomposes) Sol: 0.02% FLP(oc): >325°F IP: ? Sp.Gr: 1.21 Class IIIB Combustible Liquid, but may be difficult to ignite.	VP: 0.00004 mm FRZ: 37°F UEL: ? LEL: ?	Strong oxidizers, magnesium, alkaline pesticides [Note: Corrosive to metals.]	Filter; Isocyanate; GC/FPD; III [#5012]
Maleic anhydride C ₄ H ₂ O ₃ 108-31-6 ON3675000 2215 60	cis-Butenediolic anhydride; 2,5-Furandione; Maleic acid anhydride; Toxic anhydride	NIOSH/OSHA 1 mg/m ³ (0.25 ppm)	Unknown	Colorless needles, white lumps, or pellets with an irritating, choking odor.	MW: 98.1 BP: 396°F Sol: Reacts FLP: 218°F IP: 9.90 eV Sp.Gr: 1.48 Combustible Solid, but may be difficult to ignite.	VP: 0.2 mm MLT: 127°F UEL: 7.1% LEL: 1.4%	Strong oxidizers, water, alkalis, metals, caustics & amines above 150°F [Note: Reacts slowly with water (hydrolyzes) to form maleic acid.]	Bub; none; HPLC/UVD; II(S) [P&CAM #302]
Manganese compounds (as Mn) Mn 7439-96-5 (Metal) OO9275000 (Metal)	Metal: Colloidal manganese, Manganese-55 Synonyms of other compounds vary depending upon the specific compound.	NIOSH 1 mg/m ³ ST 3 mg/m ³ OSHA C 5 mg/m ³	N.E.	Metal: A lustrous brittle, silvery solid.	MW: 54.9 BP: 3564°F Sol: Insoluble FLP: ? IP: NA Sp.Gr: 7.20 Combustible Solid	VP: 0 mm (approx) MLT: 2271°F UEL: ? LEL: ?	Oxidizers [Note: Will react with water or steam to produce hydrogen.]	Filter; Acid; ICP; III [#7300, Elements]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	OSHA 100 mg/m ³ : DMFu/SA/SCBA 250 mg/m ³ : SA,CF/PAPRODMFu 500 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIE* 5000 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP,ASCBA Escape: HIEF/SCBAE	Inh Con	Irrit eyes, nose; metal fume fever; cough, chest pain, flu-like fever	Breath: Resp support	Resp sys, eyes
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 100 mg/m ³ : SA/SCBA/CCROVDMFu 250 mg/m ³ : SA,CF/PAPROVDMFu* 500 mg/m ³ : SCBAF/SAF/CCRFOVHIE/ GMFOVHIE/PAPRFOVHIE* SAT,CF* 5000 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP,ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Miosis, aching eyes, blurred vision, lac; eye, skin irrit; saliv; anor; nau, vomit, abdom cramps, diarr, gidd, conf, ataxia; rhin, head; tight chest, wheez, lar spasm	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, liver, blood chol, CNS, CVS, GI tract
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam Provide: Eyewash	NIOSH/OSHA 25 mg/m ³ : SA,CF* 50 mg/m ³ : SCBAF/SAF 2000 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP,ASCBA Escape: GMFOVHIE/SCBAE	Inh Ing Con	Conj; photo, double vision; nasal, upper resp irrit; bronchial asthma; derm	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Eyes, resp sys, skin
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH 10 mg/m ³ : DMXSO*/SA/SCBA 25 mg/m ³ : PAPRODM*/SA,CF 50 mg/m ³ : HIEF/PAPRTHIE/SCBAF/ SAF/SAT,CF 1000 mg/m ³ : SA-PD,PP 2000 mg/m ³ : SA-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP,ASCBA Escape: HIEF/SCBAE	Inh Ing	Parkinson's; asthenia, insom, mental cont; metal fume fever; dry throat, cough, tight chest, dysp, rales, flu-like fever; low-back pain; vomit; mal; flg	Breath: Swallow: Resp support Medical attention immed	Resp sys, CNS, blood, kidneys

Manganese compounds (as Mn)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Mercury vapor Hg 7439-97-6 OV4550000	Colloidal mercury, Metallic mercury, Quicksilver	NIOSH/OSHA 0.05 mg/m ³ [skin]	28 mg/m ³	Silver-white, heavy, odorless liquid.	MW: 200.6 BP: 674°F Sol: Insoluble Fl.P: NA IP: ?	VP: 0.0012 mm FRZ: -38°F UEL: NA LEL: NA	Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper.	Hydrar; Acid; AA cold; III [#6009]
2809 60					Sp.Gr: 13.6 Noncombustible Liquid			
Mercury (organo) alkyl compounds (as Hg)	Synonyms vary depending upon the specific (organo) alkyl compound.	NIOSH/OSHA 0.01 mg/m ³ ST 0.03 mg/m ³ [skin]	10 mg/m ³	Appearance and odor vary depending upon the specific (organo) alkyl compound.	Properties vary depending upon the specific (organo) alkyl compound.		Strong oxidizers such as chlorine	None available
Mesityl oxide (CH ₃) ₂ C=CHCOCH ₃ 141-79-7 SB4200000	Isobutenyl methyl ketone, Isopropylideneacetone, Methyl (isobutenyl) ketone, 4-Methyl-3-penten-2-one	NIOSH 10 ppm (40 mg/m ³) OSHA 15 ppm (60 mg/m ³) ST 25 ppm (100 mg/m ³)	5000 ppm	Oily, colorless to light-yellow liquid with a peppermint- or honey-like odor.	MW: 98.2 BP: 256°F Sol: 3% Fl.P: 87°F IP: 9.08 eV	VP: 9 mm FRZ: -52°F UEL: 7.2% LEL: 1.4%	Oxidizers, acids	Char; Methanol/ CS; GC/FID; III [#1301, Ketones II]
1229 26	1 ppm = 4.08 mg/m ³				Sp.Gr(59°F): 0.86 Class IC Flammable Liquid			
Methoxychlor Cl ₃ CCH(C ₆ H ₄ OCH ₃) ₂ 72-43-5 KJ3675000	p,p'-Dimethoxydiphenyltri- chloroethane; DMDT; Methoxy-DDT; 2,2-bis(p-Methoxyphenyl)- 1,1,1-trichloroethane; 1,1,1-Trichloro-2,2-bis- (p-methoxyphenyl)ethane	NIOSH Ca See Appendix A OSHA 10 mg/m ³	Ca [N.E.]	Colorless to light yellow crystals with a slight, fruity odor. [insecticide]	MW: 345.7 BP: Decomposes Sol: Insoluble Fl.P: ? IP: ?	VP: Low MLT: 171-192°F UEL: ? LEL: ?	Oxidizers	Filter; Isocytane; GC/ECD; II(4) [#5371]
2761 55					Sp.Gr(77°F): 1.41 Combustible Solid, but difficult to burn.			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: N.R. Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 0.5 mg/m ³ : CCRS ¹ /SA/SCBA 1.25 mg/m ³ : SA/CF/PAPRS ¹ (canister) 2.5 mg/m ³ : SCBAF/SAF/SAT/CF/ CCRF ² /GMFS ³ / PAPRS(canister) 28 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Abs Con	Cough, chest pain, dysp, bron pneumitis; tremor, inson; irrity, indecision; head, tlg, weak; stomatitis, saliv; GI dist, anor, low-wgt; prot; irrit eyes, skin	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, resp sys, CNS, kidneys, eyes
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 0.1 mg/m ³ : SA/SCBA 0.25 mg/m ³ : SA/CF 0.5 mg/m ³ : SCBAF/SAF/SAT/CF 10 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: SCBAE	Inh Abs lng Con	Pares; ataxia, dysarthria; vision, hearing dist; spastic, jerky, dizz; saliv; lac; nau, vomit, diarr, constip; skin burns; emotional dist	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	CNS, kidneys, eyes, skin
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed wat (flamm) Provide: Quick drench	NIOSH 250 ppm: SA/CF ¹ /PAPROV ⁴ 500 ppm: CCRFOV/GMFOV/SCBAF/SAF 5000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh lng Con	Irrit eyes, skin, muc memb; narco, coma; in animals: CNS effects	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Eyes, skin, resp sys, CNS
Clothing: Repeat Goggles: N.R. Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/HIE/SCBAE	Inh lng	None known in humans; in animals: fasc trembling, convuls; kidney, liver damage; [carc]	Skin: Breath: Swallow:	Soap wash Fresh air Medical attention immed	None known

Methoxychlor

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL, IR, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Methyl acetate $\text{CH}_3\text{COOCH}_3$ 79-20-9 A19100000	Methyl ester of acetic acid, Methyl ethanoate	NIOSH/OSHA 200 ppm (610 mg/m^3) ST 250 ppm (760 mg/m^3)	10,000 ppm	Colorless liquid with a fragrant, fruity odor.	MW: 74.1 BP: 135°F Sol: 30% F.P: 14°F IP: 10.27 eV	VP: 173 mm FRZ: -145°F UEL: 16% LEL: 3.1%	Nitrates; strong oxidizers, alkalis & acids; water [Note: Reacts slowly with water to form acetic acid & methanol.]	Char; CS; GC/FID; (I)(2) [#542]
1231 26	1 ppm = 3.08 mg/m^3				Sp.Gr: 0.93 Class IB Flammable Liquid			
Methyl acetylene $\text{CH}_3\text{C}\equiv\text{CH}$ 74-99-7 UK4250000	Allylene, Propyne, Propyne, 1-Propyne	NIOSH/OSHA 1000 ppm (1650 mg/m^3)	15,000 ppm [LEL]	Colorless gas with a sweet odor. [Note: A fuel that is liquefied as a compressed gas.]	MW: 40.1 BP: -10°F Sol: Insoluble F.P: NA (Gas) IP: 10.36 eV	VP: >1 atm FRZ: -153°F UEL: 7 LEL: 1.7%	Strong oxidizers such as chlorine, copper alloys [Note: Can decompose explosively at 4.5 to 5.6 atmospheres of pressure.]	Bag; none; GC/FID; (I)(5) [#584]
	1 ppm = 1.67 mg/m^3				Flammable Gas			
Methyl acetylene-propadiene mixture $\text{CH}_3\text{C}\equiv\text{CH}/\text{CH}_2=\text{C}=\text{CH}_2$ UK4920000	MAPP gas, Methyl acetylene-allylene mixture, Methyl acetylene-propadiene mixture (stabilized), Propadiene-methyl acetylene, Propyne-allylene mixture, Propyne-propadiene mixture	NIOSH/OSHA 1000 ppm (1800 mg/m^3) ST 1250 ppm (2250 mg/m^3)	15,000 ppm [LEL]	Colorless gas with a strong, characteristic, foul odor. [Note: A fuel that is shipped as a liquefied compressed gas.]	MW: 40.1 BP: -36 to -4°F Sol: Insoluble F.P: NA (Gas) IP: 7	VP: >1 atm FRZ: -213°F UEL: 7 LEL: 7	Strong oxidizers, copper alloys [Note: Forms explosive compounds at high pressure in contact with alloys containing more than 67% copper.]	Bag; none; GC/FID; (I)(5) [#585]
1060 17 (stabilized)	1 ppm = 1.67 mg/m^3				Flammable Gas			
Methyl acrylate $\text{CH}_2=\text{CHCOOCH}_3$ 96-33-3 AT2800000	Methoxycarbonyl ethylene, Methyl ester of acrylic acid, Methyl propenoate	NIOSH/OSHA 10 ppm (35 mg/m^3) [skin]	1000 ppm	Colorless liquid with an acid odor.	MW: 86.1 BP: 176°F Sol: 6% F.P: 25°F IP: 9.90 eV	VP: 65 mm FRZ: -106°F UEL: 25% LEL: 2.6%	Nitrates, oxidizers such as peroxides, strong alkalis [Note: Polymerizes easily; usually contains an inhibitor such as hydroquinone.]	Char; CS; GC/FID; (I)(2) [#538]
1919 27 (inhibited)	1 ppm = 3.58 mg/m^3				Sp.Gr: 0.96 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 5)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: CCROV*/PAPROV* 2000 ppm: SA*/SCBA* 5000 ppm: SA-CF* 10,000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit nose, throat; head, drow; optic atrophy	Eye: Skin: Breath: Swallow: Irr immed Water flush prompt Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Prevent skin freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 10,000 ppm: SA/SCBA 15,000 ppm: SA-CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh	Hyperexcitability, tremors, anes; irrit resp sys	Breath: Resp support	CNS
Clothing: Prevent skin freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 10,000 ppm: SA/SCBA 15,000 ppm: SA-CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Con	Frostbite; disorientation, excitement	Eye: Skin: Breath: Irr immed Water flush immed Resp support	CNS, skin, eyes
Clothing: Any poss Goggles: Reason prob Wash: Immed wet Change: N.R. Remove: Immed wet (flamm) Provide: Quick drench		NIOSH/OSHA 100 ppm: SA*/SCBA* 250 ppm: SA-CF* 500 ppm: SCBAF/SAF 1000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Con	Irrit eyes, upper resp sys, skin	Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed	Resp sys, eyes, skin

Methyl acrylate

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Methylal CH ₃ OCH ₂ OCH ₃ 109-87-5 PA8750000	Dimethoxymethane, Formal, Formaldehyde dimethylacetal, Methoxymethyl methyl ether, Methylene dimethyl ether	NIOSH/OSHA 1000 ppm (3100 mg/m ³)	15,000 ppm [LEL]	Colorless liquid with a chloroform-like odor.	MW: 76.1 BP: 111°F Sol: 33% FLP(oc): -26°F IP: 10.60 eV	VP: 330 mm FRZ: -157°F UEL: 13.8% LEL: 2.2%	Strong oxidizers, acids	Char; Hexane; GC/FID; III [#1611]
1234 26	1 ppm = 3.16 mg/m ³				Sp.Gr: 0.86 Class IB Flammable Liquid			
Methyl alcohol CH ₃ OH 67-56-1 PC1400000	Carbinol, Columbian spirits, Methanol, Wood alcohol, Wood spirits	NIOSH/OSHA 200 ppm (260 mg/m ³) ST 250 ppm (325 mg/m ³) [skin]	25,000 ppm	Colorless liquid with a characteristic pungent odor.	MW: 32.1 BP: 147°F Sol: Miscible FLP: 52°F IP: 10.84 eV	VP: 92 mm FRZ: -144°F UEL: 36% LEL: 6.0%	Strong oxidizers	Si gel; Water; GC/FID; III [#2000, Methanol]
1230 28	1 ppm = 1.33 mg/m ³				Sp.Gr: 0.79 Class IB Flammable Liquid			
Methylamine CH ₃ NH ₂ 74-89-5 PF6300000	Aminomethane, Anhydrous methylamine, Aqueous methylamine, Monomethylamine	NIOSH/OSHA 10 ppm (12 mg/m ³)	100 ppm	Colorless gas with a fish- or ammonia-like odor. [Note: A liquid below 21°F. Shipped as a liquefied compressed gas.]	MW: 31.1 BP: 21°F Sol: Soluble FLP: NA (Gas) IP: 8.97 eV	VP: >1 atm FRZ: -136°F UEL: 20.7% LEL: 4.9%	Mercury, strong oxidizers, nitromethane [Note: Corrosive to copper & zinc alloys, aluminum & galvanized surfaces.]	XAD-7; Reagent; HPLC/FID; OSHA [#40]
1061 19 (anhydrous) 1235 68 (aqueous soln)	1 ppm = 1.29 mg/m ³				Sp.Gr: 0.70 (Liquid at 13°F) Flammable Gas			
Methyl (n-amy) ketone CH ₃ CO(CH ₂) ₃ CH ₃ 110-43-0 MJ5075000	Amyl methyl ketone, n-Amyl methyl ketone, 2-Heptanone	NIOSH/OSHA 100 ppm (465 mg/m ³) ACGIH 50 ppm (235 mg/m ³)	4000 ppm	Colorless to white liquid with a banana-like, fruity odor.	MW: 114.2 BP: 305°F Sol: 0.4% FLP: 102°F IP: 9.33 eV	VP: 3 mm FRZ: -32°F UEL(250°F): 7.9% LEL(151°F): 1.1%	Strong acids, alkalis & oxidizers [Note: Will attack some forms of plastic.]	Char; Methanol/ CS; GC/FID; III [#1301, Ketones I]
1110 26	1 ppm = 4.75 mg/m ³				Sp.Gr: 0.81 Class II Combustible Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 10,000 ppm: SA/SCBA 15,000 ppm: SA,CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Mild irrit eyes, upper resp; anes; irrit skin	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Skin, resp sys, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 2000 ppm: SA/SCBA 5000 ppm: SA,CF 10,000 ppm: SCBAF/SAF/SAT:CF 25,000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: SCBAE	Inh Abs Ing Con	Eye irrit, head, drow, li-head, nau, vomit; vis dist, blindness	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Eyes, skin, CNS, GI tract
Clothing: Any poss liq Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench	NIOSH/OSHA 100 ppm: SCBAF/SAF/CCRFs/GMFS/ PAPRS* §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Irrit eyes, resp sys; cough; skin, muc memb burns; derm; con	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed contam	ACGIH 500 ppm: CCRPV/SA*/SCBA* 1250 ppm: SA,CF*/PAPROV* 2500 ppm: CCRFOV/GMFOV/SCBAF/ SAF/SAT:CF* 4000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, muc memb; head; narco, coma; derm	Eye: Irr immed Skin: Soap wash Breath: Fresh air Swallow: Medical attention immed	Eyes, skin, resp sys, CNS, PNS

Methyl (n-amy) ketone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL F.L.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Methyl bromide CH ₃ Br 74-83-9 PA4900000	Bromomethane, Monobromomethane	NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 5 ppm (20 mg/m ³) [skin]	Ca [2000 ppm]	Colorless gas with a chloroform-like odor at high concentrations. [Note: A liquid below 38°F. Shipped as a liquefied compressed gas.]	MW: 95.0 BP: 38°F Sol: 2% F.L.P.: ? IP: 10.54 eV	VP: >1 atm FRZ: -137°F UEL: 16.0% LEL: 10%	Aluminum, magnesium, strong oxidizers [Note: Attacks aluminum to form aluminum trimethyl, which is SPONTANEOUSLY flammable.]	Char(pt) (2); CS; GC/FID; III [#2520]
1062 55	1 ppm = 3.95 mg/m ³				Sp.Gr: 1.73 (Liquid at 32°F) Flammable Gas, but only in presence of a high energy ignition source.			
Methyl Cellosolve* CH ₃ OCH ₂ CH ₂ OH 109-86-4 KL5775000	EGME, Ethylene glycol monomethyl ether, Glycol monomethyl ether, 2-Methoxyethanol	NIOSH Reduce exposure to lowest feasible concentration. OSHA 25 ppm (80 mg/m ³) [skin]	* [2000 ppm]	Colorless liquid with a mild, ether-like odor.	MW: 76.1 BP: 256°F Sol: Miscible F.L.P.: 102°F IP: 9.60 eV	VP: 6 mm FRZ: -121°F UEL: 1.8% LEL: 14%	Strong oxidizers, caustics	Char; Methanol/ CH ₂ Cl ₂ ; GC/FID; III [#1403, Alcohols IV]
1188 26	1 ppm = 3.16 mg/m ³				Sp.Gr: 0.96 Class II Combustible Liquid			
Methyl Cellosolve* acetate CH ₃ COOCH ₂ CH ₂ OCH ₃ 110-49-6 KL5950000	EGMEA, Ethylene glycol monomethyl ether acetate, Glycol monomethyl ether acetate, 2-Methoxyethyl acetate	NIOSH Reduce exposure to lowest feasible concentration. OSHA 25 ppm (120 mg/m ³) [skin]	* [4000 ppm]	Colorless liquid with a mild, ether-like odor.	MW: 118.1 BP: 293°F Sol: Miscible F.L.P.: 120°F IP: ?	VP: 2 mm FRZ: -85°F UEL: 8.2% LEL: 1.7%	Nitrates; strong oxidizers, alkalis & acids	Char; CS; GC/FID; III(2) [#539]
1189 26	1 ppm = 4.91 mg/m ³				Sp.Gr: 1.01 Class II Combustible Liquid			
Methyl chloride CH ₃ Cl 74-87-3 PA6300000	Chloromethane, Monochloromethane	NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 50 ppm (105 mg/m ³) ST 100 ppm (210 mg/m ³)	Ca [10,000 ppm]	Colorless gas with a faint, sweet odor which is not noticeable at dangerous concentrations. [Note: Shipped as a liquefied compressed gas.]	MW: 50.5 BP: -12°F Sol: 0.5% F.L.P.: NA (Gas) IP: 11.28 eV	VP: >1 atm FRZ: -144°F UEL: 17.4% LEL: 8.1%	Chemically-active metals such as potassium, powdered aluminum, zinc & magnesium; water [Note: Reacts with water (hydrolyzes) to form hydrochloric acid.]	Char(2); CH ₂ Cl ₂ ; GC/FID; III [#1001]
1063 18	1 ppm = 2.10 mg/m ³				Flammable Gas			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Reason prob Wash: Immed wet Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Head; vis dist; verti; nau, vomit; mal; hand tremor; convuls; dysp; irrit eyes; skin irrit, vesic; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	CNS, resp sys, skin, eyes
Clothing: Repeat Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Head, drow, weak; ataxia, tremor, som; anemic pallor, irrit eyes; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	CNS, blood, skin, eyes, kidneys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Kidney damage; brain damage; eye irrit; in animals: eye, nose, throat irrit; narco	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Kidneys, brain, CNS, PNS
Clothing: Prevent wet or freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: SCBAE	Inh Con	Dizz, nau, vomit; vis dist; stagger; slur speech; convuls, coma; liver, kidney damage, frostbite; [carc]	Eye: Skin: Breath:	Irr immed Water flush immed Resp support	CNS, liver, kidneys, skin

Methyl chloride

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Methyl chloroform CH_2Cl_2 71-55-6 KJ2975000	Chloroethane; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized)	NIOSH C 350 ppm (1900 mg/m ³) [15-min] OSHA 350 ppm (1900 mg/m ³) ST 450 ppm (2450 mg/m ³)	1000 ppm	Colorless liquid with a mild, chloroform-like odor.	MW: 133.4 BP: 165°F Sol: 0.4% F.L.P.: None IP: 11.00 eV Sp.Gr: 1.34 Noncombustible Liquid, however the vapor will burn.	VP: 100 mm FRZ: -23°F UEL: 12.5% LEL: 7.5%	Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.]	Char; CS; GC/FID; III [#1003, Halogenated Hydrocarbons]
2831 74	1 ppm = 5.55 mg/m ³							
Methylcyclohexane C_7H_{14} 108-87-2 GV6125000	Cyclohexylmethane, Hexahydrotoluene	NIOSH/OSHA 400 ppm (1600 mg/m ³)	10,000 ppm	Colorless liquid with a faint, benzene-like odor.	MW: 98.2 BP: 214°F Sol: Insoluble F.L.P.: 23°F IP: 9.85 eV Sp.Gr: 0.77 Class IB Flammable Liquid	VP(72°F): 43 mm FRZ: -195°F UEL: 6.7% LEL: 1.2%	Strong oxidizers	Char; CS; GC/FID; III [#1500, Hydrocarbons]
2296 27	1 ppm = 4.08 mg/m ³							
Methylcyclohexanol $\text{C}_7\text{H}_{14}\text{O}$ 25639-42-3 GW0175000	Hexahydrocresol, Hexahydromethylphenol	NIOSH/OSHA 50 ppm (235 mg/m ³)	10,000 ppm	Straw-colored liquid with a weak odor like coconut oil.	MW: 114.2 BP: 311-356°F Sol: 4% F.L.P.: 154°F IP: ? Sp.Gr: 0.92 Class IIIA Combustible Liquid	VP(86°F): 2 mm FRZ: -58°F UEL: ? LEL: ?	Strong oxidizers	Char; CH_2Cl_2 ; GC/FID; II(4) [#5374]
2617 26	1 ppm = 4.75 mg/m ³							
o-Methylcyclohexanone $\text{C}_7\text{H}_{12}\text{O}$ 583-60-8 GW1750000	2-Methylcyclohexanone	NIOSH/OSHA 50 ppm (230 mg/m ³) ST 75 ppm (345 mg/m ³) [skin]	2500 ppm	Colorless liquid with a weak peppermint-like odor.	MW: 112.2 BP: 325°F Sol: Insoluble F.L.P.: 118°F IP: ? Sp.Gr: 0.93 Class II Combustible Liquid	VP: 1 mm (approx) FRZ: 7°F UEL: ? LEL: ?	Strong oxidizers	Porapak; Acetone; GC/FID; III [#2521]
2297 26	1 ppm = 4.66 mg/m ³							

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet		NIOSH/OSHA 1000 ppm: SA*/SCBA* §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Head, lass, CNS depres, poor equi; irrit eyes; derm; card arrhy	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, CNS, CVS, eyes
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 4000 ppm: SA/SCBA 10,000 ppm: SA,CF/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Li-head, drow; skin, nose, throat irrit	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam		NIOSH/OSHA 500 ppm: SA*/SCBA* 1250 ppm: SA,CF* 2500 ppm: SCBAF/SAF 10,000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Head; irrit eyes, upper resp sys; in animals: narco; liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin, eyes; in animals: CNS, liver, kidneys
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam		NIOSH/OSHA 500 ppm: SA*/SCBA* 1250 ppm: SA,CF* 2500 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	In animals: narco; irrit eyes, muc memb; derm	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	In animals: resp sys, liver, kidneys, skin

o-Methylcyclohexanone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL, IP, Sp.Gr., flammability	VP, FRZ, UEL, LEL		
Methylene bisphenyl isocyanate $\text{CH}_2(\text{C}_6\text{H}_4\text{NCO})_2$ 101-68-8 NG9350000	4,4'-Diphenylmethane diisocyanate; MDI; Methylene bis(4-phenyl isocyanate); Methylene di-p-phenylene ester of isocyanic acid	NIOSH 0.05 mg/m ³ (0.005 ppm) C 0.2 mg/m ³ (0.020 ppm) [10-min] OSHA C 0.2 mg/m ³ (0.02 ppm)	100 mg/m ³	White to light-yellow, odorless flakes. [Note: A liquid above 99°F.]	MW: 250.3 BP: 342°F Sol: 0.2% FLP(oc): 398°F IP: 7	VP(104°F): 0.001 mm MLI: 99°F UEL: 7 LEL: 7	Strong alkalis, acids, alcohol	Sub: Acetate; HPLC/UV/D; III [#5521]
2489 53					Sp.Gr(122°F): 1.19 Combustible Solid			
Methylene chloride CH_2Cl_2 75-09-2 PA8050000	Dichloromethane, Methylene dichloride	NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 500 ppm C 1000 ppm 2000 ppm (5-min max peak in any 2 hrs)	Ca [5000 ppm]	Colorless liquid with a chloroform-like odor. [Note: A gas above 104°F.]	MW: 84.9 BP: 104°F Sol: 2% FLP: 7 IP: 11.32 eV	VP: 350 mm FRZ: -139°F UEL: 22% LEL: 14%	Strong oxidizers; caustics; chemically-active metals such as aluminum, magnesium powders, potassium & sodium; concentrated nitric acid	Char(2); CS ₂ ; GC/FID; III [#1005]
1593 74	1 ppm = 3.53 mg/m ³				Sp.Gr: 1.33 Combustible Liquid			
Methyl formate HCOOCH_3 107-31-3 LO8925000	Methyl ester of formic acid, Methyl methanoate	NIOSH/OSHA 100 ppm (250 mg/m ³) ST 150 ppm (375 mg/m ³)	5000 ppm	Colorless liquid with a pleasant odor. [Note: A gas above 89°F.]	MW: 60.1 BP: 89°F Sol: 30% FLP: -2°F IP: 10.82 eV	VP: 476 mm FRZ: -148°F UEL: 23% LEL: 4.5%	Strong oxidizers [Note: Reacts slowly with water to form methanol & formic acid.]	Carbo-B(2); Ethyl acetate; GC/FID; II(S) [#5291]
1243 26	1 ppm = 2.50 mg/m ³				Sp.Gr: 0.98 Class IA Flammable Liquid			
5-Methyl-3-heptanone $\text{CH}_3\text{CH}_2\text{CO}(\text{CH}_2)_4\text{CH}_3$ 541-85-5 MJ7350000	Amyl ethyl ketone, Ethyl amyl ketone	NIOSH/OSHA 25 ppm (130 mg/m ³)	3000 ppm	Colorless liquid with a pungent odor.	MW: 128.2 BP: 315°F Sol: Insoluble FLP: 138°F IP: 7	VP: 2 mm FRZ: -70°F UEL: 7 LEL: 7	Strong oxidizers	Char; Methanol/ CS ₂ ; GC/FID; III, [#1301, Ketones I]
2271 26	1 ppm = 5.33 mg/m ³				Sp.Gr: 0.82 Class II Combustible Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection -- maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Goggles: Wash: Change: Remove:	Reason prob Any poss Prompt contam After work if reason prob contam Prompt non-imperv contam	NIOSH 2 mg/m ³ : SA*/SCBA* 5 mg/m ³ : SA,CF* 10 mg/m ³ : SCBAF/SAF 100 mg/m ³ : SCBAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; cough, pulm secretions, chest pain, dysp; asthma	Eye: Skin: Breath: Swallow	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, eyes
Clothing: Goggles: Wash: Change: Remove:	Repeat Reason prob Prompt wet N.R. Prompt non-imperv wet	NIOSH v: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Ftg, weak, sleepiness, li-head; limbs numb, tingle; nau; irrit eyes, skin; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, CVS, eyes, CNS
Clothing: Goggles: Wash: Change: Remove:	Repeat Reason prob Prompt wet N.R. Immed wet (flamm)	NIOSH/OSHA 1000 ppm: SA*/SCBA* 2500 ppm: SA,CF* 5000 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Eye, nose irrit; chest oppression, dysp; vis dist; CNS depres; in animals: pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Eyes, resp sys, CNS
Clothing: Goggles: Wash: Change: Remove:	Any poss Reason prob Prompt wet N.R. Prompt non-imperv wet	NIOSH/OSHA 250 ppm: SA*/SCBA* 625 ppm: SA,CF*/PAPROV* 1300 ppm: CORFOV 1250 ppm: GMFOV/SCBAF/SAF 3000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, muc memb; head; narco, coma; derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush Resp support Medical attention immed	Eyes, skin, resp sys, CNS

5-Methyl-3-heptanone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Methyl hydrazine CH ₂ NHNH ₂ 60-34-4 MV5600000	Monomethyl hydrazine, MMH	NIOSH Ca See Appendix A C 0.04 ppm (0.08 mg/m ³) (2-hr) OSHA C 0.2 ppm (0.35 mg/m ³) [skin]	Ca [50 ppm]	Fuming, colorless liquid with an ammonia-like odor.	MW: 46.1 BP: 190°F Sol: Miscible Fl.P: 17°F IP: 8.00 eV	VP(77°F): 50 mm FRZ: -62°F UEL: 92% LEL: 2.5%	Oxides of iron; copper; manganese; lead; copper alloys; porous materials such as earth, asbestos, wood & cloth; strong oxidizers such as fluorine & chlorine; nitric acid; hydrogen peroxide	Bub; Pho-acid; Vis; II(3); [#S149]
1244 28	1 ppm = 1.92 mg/m ³		ACGIH A2		Sp.Gr(77°F): 0.87 Class IB Flammable Liquid			
Methyl iodide CH ₃ I 74-88-4 PA9450000	Iodomethane, Moniodomethane	NIOSH Ca See Appendix A 2 ppm (10 mg/m ³) [skin] OSHA 2 ppm (10 mg/m ³) [skin]	Ca [800 ppm]	Colorless liquid with a pungent, ether-like odor. [Note: Turns yellow, red, or brown on expo- sure to light & moisture.]	MW: 141.9 BP: 109°F Sol: 1% Fl.P: NA IP: 9.54 eV	VP(77°F): 400 mm FRZ: -98°F UEL: NA LEL: NA	Strong oxidizers [Note: Decomposes at 518°F.]	Char; Toluene; GC/FID; III [#1014]
2644 55	1 ppm = 5.90 mg/m ³		ACGIH A2		Sp.Gr: 2.28 Noncombustible Liquid			
Methyl isobutyl carbinol (CH ₃) ₂ CHCH ₂ CH- (OH)CH ₃ 108-11-2 SA7350000	Isobutylmethylcarbinol, Methyl amyl alcohol, 4-Methyl-2-pentanol, MIBC	NIOSH/OSHA 25 ppm (100 mg/m ³) ST 40 ppm (165 mg/m ³) [skin]	2000 ppm	Colorless liquid with a mild odor.	MW: 102.2 BP: 271°F Sol: 2% Fl.P: 106°F IP: 7	VP: 3 mm FRZ: -130°F UEL: 5.5% LEL: 1.0%	Strong oxidizers	Char; 2-Propanol/ CS; GC/FID; III [#1402, Alcohols III]
2053 26	1 ppm = 4.25 mg/m ³				Sp.Gr: 0.81 Class II Combustible Liquid			
Methyl isocyanate CH ₃ NCO 624-83-9 NQ9450000	Methyl ester of isocyanic acid, MIC	NIOSH/OSHA 0.02 ppm (0.05 mg/m ³) [skin]	20 ppm	Colorless liquid with a sharp, pungent odor.	MW: 57.1 BP: 139°F Sol(59°F): 10% Fl.P: 19°F IP: 10.67 eV	VP: 348 mm MLT: -49°F UEL: 26% LEL: 5.3%	Water, oxidizers, acids, alkalis, amines, iron, tin, copper	XAD-7; CH ₃ CN; HPLC/FLD; OSHA [#54]
2480 30	1 ppm = 2.37 mg/m ³				Sp.Gr: 0.96 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Any poss	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCB Escape: SCBAE	Inh Abs Ing Con	Irrit eyes, vomit, diarr, resp sys irrit, tremors, ataxia; anoxia, cyan; convuls, [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	CNS, resp sys, liver, blood, CVS, eyes
Goggles:	Any poss						
Wash:	Immed contam						
Change:	N.R.						
Remove:	Immed wet (flamm)						
Provide:	Eyewash, quick drench						
Clothing:	Repeat	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCB Escape: GMFOV/SCBAE	Inh Abs Ing Con	Nau, vomit; verti, ataxia; slurred speech, drow; dermat; eye irrit; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap flush immed Resp support Medical attention immed	CNS, skin, eyes
Goggles:	Reason prob						
Wash:	Immed wet						
Change:	N.R.						
Remove:	Immed non-imperv contam						
Clothing:	Repeat	NIOSH/OSHA 625 ppm: SA,CF* 1250 ppm: SCBAF/SAF 2000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCB Escape: GMFOV/SCBAE	Inh Abs Ing Con	Eye irrit; head, drow; derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin
Goggles:	Reason prob						
Wash:	Prompt wet						
Change:	N.R.						
Remove:	Immed wet (flamm)						
Clothing:	Any poss	NIOSH/OSHA 0.2 ppm: SA*/SCBA* 0.5 ppm: SA,CF* 1 ppm: SCBAF/SAF 20 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCB Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; cough, secretions, chest pain, dysp; asthma; eye, skin inj; in animals: pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, eyes, skin
Goggles:	Any poss						
Wash:	Immed contam						
Change:	N.R.						
Remove:	Immed wet (flamm)						
Provide:	Eyewash, quick drench						

Methyl isocyanate

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Methyl mercaptan CH ₃ SH 74-93-1 PB4375000	Mercaptomethane, Methanethiol, Methyl sulfhydrate	NIOSH C 0.5 ppm (1 mg/m ³) [15-min] OSHA 0.5 ppm (1 mg/m ³)	400 ppm	Colorless gas with a disagreeable odor like garlic or rotten cabbage. [Note: A liquid below 43°F. Shipped as a liquefied compressed gas.]	MW: 48.1 BP: 43°F Sol: 2% Fl.P(oc): 0°F (Liquid) IP: 9.44 eV Sp.Gr: 0.90 (Liquid at 32°F) Flammable Gas Class IA Flammable Liquid	VP: >1 atm FRZ: -186°F UEL: 21.8% LEL: 3.9%	Strong oxidizers, bleaches	Filter; HCl/CH ₂ Cl ₂ ; GC/FPD; OSHA [#26]
1064 13	1 ppm = 2.00 mg/m ³							
Methyl methacrylate CH ₂ =C(CH ₃)COOCH ₃ 80-62-6 OZ5075000	Methacrylate monomer, Methyl ester of methacrylic acid, Methyl-2-methyl-2-propenoate	NIOSH/OSHA 100 ppm (410 mg/m ³)	4000 ppm	Colorless liquid with an acrid, fruity odor.	MW: 100.1 BP: 214°F Sol: Slight Fl.P(oc): 50°F IP: 9.70 eV Sp.Gr: 0.94 Class IB Flammable Liquid	VP(77°F): 40 mm FRZ: -54°F UEL: 8.2% LEL: 1.7%	Nitrates, oxidizers, peroxides, strong alkalis, moisture [Note: May polymerize if subjected to heat, oxidizers, or ultraviolet light. Usually contains an inhibitor such as hydroquinone.]	XAD-2; CS ₂ ; GC/FID; III [#2537]
1247 27 (inhibited)	1 ppm = 4.16 mg/m ³							
alpha-Methyl styrene C ₉ H ₈ C(CH ₃)=CH ₂ 98-83-9 WL5250000	AMS, Isopropenyl benzene, 1-Methyl-1-phenylethylene, 2-Phenyl propylene	NIOSH/OSHA 50 ppm (240 mg/m ³) ST 100 ppm (485 mg/m ³)	5000 ppm	Colorless liquid with a characteristic odor.	MW: 118.2 BP: 330°F Sol: Insoluble Fl.P: 129°F IP: 8.35 eV Sp.Gr: 0.91 Class II Combustible Liquid	VP: 2 mm FRZ: -10°F UEL: 6.1% LEL: 1.9%	Oxidizers, peroxides, halogens, catalysts for vinyl or ionic polymers; aluminum, iron chloride, copper [Note: Usually contains an inhibitor such as tert-butyl catechol.]	Char; CS ₂ ; GC/FID; III [#1501, Aromatic Hydro- carbons]
12001-26-2 VV8760000	1 ppm = 4.91 mg/m ³							
Mica (containing less than 1% quartz)	Silicate mica	NIOSH/OSHA 3 mg/m ³ (resp)	N.E.	Colorless, odorless flakes or sheets of hydrous silicates.	MW: 797(approx) BP: ? Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 2.6-3.2 Noncombustible Solid	VP: 0 mm (approx) MLT: ? UEL: NA LEL: NA	None reported	Filter; none; Grav; III [#0600, Nuisance Dust (resp)]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Prevent freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 5 ppm: SA/SCBA/CCROV 12.5 ppm: SA/CF/PAPROV 25 ppm: SCBAF/SAF/CCRFOV/GMFOV/ PAPRTOV/SAT/CF 400 ppm: SA/PD/PP 6: SCBAF/PD/PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Con	Narco; cyan; convuls; pulm irrit	Eye: Irr immed Skin: Water flush immed Breath: Resp support	Resp sys, CNS	
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: PAPROV ⁴ /CCRFOV 2500 ppm: SA/CF ¹ 4000 ppm: GMFOV/SCBAF/SAF 6: SCBAF/PD/PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; derm	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Eyes, upper resp sys, skin	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 500 ppm: CCROV ⁴ /SA ¹ /SCBA* 1000 ppm: PAPROV ⁴ /CCRFOV 1250 ppm: SA/CF ¹ 2500 ppm: GMFOV/SCBAF/SAF 5000 ppm: SAF/PD/PP 6: SCBAF/PD/PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; drow; derm	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Eyes, resp sys, skin	
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 15 mg/m ³ : DM 30 mg/m ³ : DMXSQ/SA/SCBA 75 mg/m ³ : PAPRDM/SA/CF 150 mg/m ³ : HIEF/PAPRTHIE/SCBAF/ SAF/SAT/CF 1500 mg/m ³ : SA/PD/PP 6: SCBAF/PD/PP/SAF/PD,PP:ASCBA Escape: HIEF/SCBAE	Inh	Pneumoconiosis, cough, dysp; weak; low-wgt	Eye: Irr immed Breath: Fresh air	Lungs	

Mica (containing less than 1% quartz)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Molybdenum (soluble compounds as Mo)	Synonyms vary depending upon the specific soluble compound.	NIOSH See Appendix D OSHA 5 mg/m ³	N.E.	Appearance and odor vary depending upon the specific soluble compound.	Properties vary depending upon the specific soluble compound.		Alkali metals, sodium, potassium, molten magnesium	Filter; Acid; ICP; III [#7300, Elements]
Molybdenum (insoluble compounds as Mo)	Metal: Molybdenum metal Synonyms of other insoluble compounds vary depending upon the specific compound.	NIOSH See Appendix D OSHA 10 mg/m ³	N.E.	Metal: Dark gray or black powder with a metallic luster.	MW: 95.9 BP: 8717°F Sol: Insoluble FL.P: NA IP: NA	VP: 0 mm (approx) MLT: 4752°F UEL: NA LEL: NA	Strong oxidizers	Filter; Acid; ICP; III [#7300, Elements]
Mo (Metal) 7439-93-7 (Metal) QA4680000 (Metal)					Sp.Gr: 10.28 (Metal) Flammable in form of dust or powder.			
Monomethyl aniline C ₇ H ₉ NHCH ₃ 100-61-8 BY4550000	MA, Methyl aniline, N-Methyl aniline, (Methylamino)benzene, Methylphenyl amine	NIOSH/OSHA 0.5 ppm (2 mg/m ³) [skin]	100 ppm	Yellow to light-brown liquid with a weak, ammonia-like odor.	MW: 107.2 BP: 384°F Sol: Insoluble FL.P: 175°F IP: 7.32 eV	VP(97°F): 1 mm FRZ: -71°F UEL: ? LEL: ?	Strong acids, strong oxidizers	Bub; NaOH; GC/FID; III(3) [#S153]
2294 57	1 ppm = 4.46 mg/m ³				Sp.Gr: 0.99 Class IIIA Combustible Liquid			
Morpholine C ₄ H ₉ ONH 110-91-8 QD6475000	Diethylene imidoxide; Diethylene oxide; Tetrahydro-1,4-oxazine; Tetrahydro-p-oxazine	NIOSH/OSHA 20 ppm (70 mg/m ³) ST 30 ppm (105 mg/m ³) [skin]	8000 ppm	Colorless liquid with a weak, ammonia- or fish-like odor. [Note: A solid below 23°F.]	MW: 87.1 BP: 264°F Sol: Miscible FL.P(oc): 58°F IP: 6.68 eV	VP: 6 mm FRZ: 23°F UEL: 11.2% LEL: 1.4%	Strong acids, strong oxidizers, metals [Note: Corrosive to metals.]	Si gel; H ₂ SO ₄ /NaOH; GC/FID; III(3) [#S150]
2054 29	1 ppm = 3.62 mg/m ³				Sp.Gr: 1.00 Class IC Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing:	Repeat	OSHA	Inh	In animals: anor; inco;	Eye:	Resp sys;
Goggles:	Reason prob	25 mg/m ³ : DM*	Ing	irrit eyes, nose, throat;	Skin:	in animals:
Wash:	Prompt contam	50 mg/m ³ : DMXSO*/SA*/SCBA*	Con	dysp; anemia	Breath:	kidneys, blood
Change:	N.R.	125 mg/m ³ : PAPRDM*/SA,CF*			Swallow:	
Remove:	Prompt non-imperv contam	250 mg/m ³ : HIEF/PAPRTHIE*/ SAT,CF*/SCBAF/SAF 2500 mg/m ³ : SAF,PD,PP ‡: SCBAF,PD,PP/SAF,PD,PP,ASCBA Escape: HIEF/SCBAE				
Clothing:	N.R.	OSHA	Inh	In animals: irrit eyes,	Breath:	Resp support
Goggles:	Reason prob	50 mg/m ³ : DM*	Ing	nose, throat; anor, diarr,	Swallow:	Medical attention
Wash:	N.R.	100 mg/m ³ : DMXSO*/SA/SCBA		low-wgt; listlessness;		immed
Change:	N.R.	250 mg/m ³ : PAPRDM*/SA,CF		liver, kidney damage		
Remove:	N.R.	500 mg/m ³ : HIEF/PAPRTHIE/SAT,CF/ SCBAF/SAF 5000 mg/m ³ : SA,PD,PP ‡: SCBAF,PD,PP/SAF,PD,PP,ASCBA Escape: HIEF/SCBAE				None known in humans
Clothing:	Reason prob	NIOSH/OSHA	Inh	Weak, dizz, head; dysp,	Eye:	Irr immed
Goggles:	Reason prob	5 ppm: SA/SCBA	Abs	cyan; methemoglobinemia;	Skin:	Soap wash immed
Wash:	Immed contam	12.5 ppm: SA,CF	Ing	pulm edema; liver, kidney	Breath:	Resp support
Change:	N.R.	25 ppm: SCBAF/SAF/SAT,CF	Con	damage	Swallow:	Medical attention
Remove:	Immed non-imperv contam	100 ppm: SAF,PD,PP ‡: SCBAF,PD,PP/SAF,PD,PP,ASCBA Escape: GMFS/SCBAE				immed
Clothing:	Any poss >25%/Repeat <25%	NIOSH/OSHA	Inh	Vis dist; nose irrit; cough;	Eye:	Irr immed
Goggles:	Any poss	550 ppm: SA,CF/PAPROV [†]	Abs	resp irrit; eye, skin irrit;	Skin:	Water flush immed
Wash:	Prompt Contam	1000 ppm: SCBAF/SAF/CCRFOV	Ing	liver, kidney, damage	Breath:	Art resp
Change:	N.R.	8000 ppm: SAF,PD,PP	Con		Swallow:	Medical attention
Remove:	Immed wet (flamm)	‡: SCBAF,PD,PP/SAF,PD,PP,ASCBA Escape: GMFOV/SCBAE				immed
Provide:	15-25%: Eyewash/ >25%: Quick drench					

Morpholine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Naphtha (coal tar) 8030-30-6 DE3030000	Crude solvent coal tar naphtha, High solvent naphtha, Naphtha	NIOSH/OSHA 100 ppm (400 mg/m ³)	10,000 ppm [LEL]	Reddish-brown, mobile liquid with an aromatic odor.	MW: 110(approx) BP: 320-428°F Sol: Insoluble Fl.P: 100-109°F IP: ?	VP: <5 mm FRZ: ? UEL: ? LEL: ?	Strong oxidizers	Char; CS; GC/FID; III [#1550]
2553 27	1 ppm = 4.57 mg/m ³ (approx)				Sp.Gr: 0.89-0.97 Class II Combustible Liquid			
Naphthalene C ₁₀ H ₈ 91-20-3 QJ0525000	Naphthalin, Tar camphor, White tar	NIOSH/OSHA 10 ppm (50 mg/m ³) ST 15 ppm (75 mg/m ³)	500 ppm	Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]	MW: 128.2 BP: 424°F Sol: 0.003% Fl.P: 174°F IP: 8.12 eV	VP: 0.08 mm MLT: 176°F UEL: 5.9% LEL: 0.9%	Strong oxidizers, chromic anhydride	Char; CS; GC/FID; III [#1501, Aromatic Hydro- carbons]
1334 32					Sp.Gr: 1.15 Combustible Solid, but will take some effort to ignite.			
alpha-Naphthylamine C ₁₀ H ₉ NH ₂ 134-32-7 QM1400000	1-Aminonaphthalene, 1-Naphthylamine	NIOSH Ca See Appendix A OSHA [1910.1004] See Appendix B	Ca	Colorless crystals with an ammonia- like odor. [Note: Darkens in air to a reddish- purple color.]	MW: 143.2 BP: 573°F Sol: 0.002% Fl.P: 315°F IP: 7.30 eV	VP(220°F): 1 mm MLT: 122°F UEL: ? LEL: ?	Oxidizes in air	Filter/ Si gel; CH ₃ COOH/ 2-Pro- panol; GC/FID; III [#5518]
2077 55					Sp.Gr(77°F): 1.12 Combustible Solid			
beta-Naphthylamine C ₁₀ H ₉ NH ₂ 91-59-8 QM2100000	2-Aminonaphthalene, 2-Naphthylamine	NIOSH Ca See Appendix A OSHA [1910.1009] See Appendix B ACGIH A1	Ca	Odorless, white to red crystals with a faint aromatic odor. [Note: Darkens in air to a reddish- purple color.]	MW: 143.2 BP: 583°F Sol: Miscible in hot water Fl.P: 315°F IP: 9.71 eV	VP(226°F): 1 mm MLT: 232°F UEL: ? LEL: ?	None reported	Filter/ Si gel; CH ₃ COOH/ 2-Pro- panol; GC/FID; III [#5518]
1650 55					Sp.Gr(208°F): 1.06 Combustible Solid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)		Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet		NIOSH/OSHA 1000 ppm: PAPROV ⁶ /CCRFOV 2500 ppm: SA-CF ⁷ 5000 ppm: GMFOV/SCBAF/SAF 10,000 ppm: SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	LI-head, drow; irrit eyes, nose, skin; derm	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, eyes, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam		NIOSH/OSHA 100 ppm: CCRROVDM*/SA*/SCBA* 250 ppm: SA-CF*/PAPROVDM* 500 ppm: CCRFOVH/E/SCBAF/SAF §: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFOVH/E/SCBAE	Inh Abs Ing Con	Eye irrit; head; conf, excitement, mal; nau, vomit, abdom pain; irrit bladder; profuse sweat; jaun; hema, hemog, renal shutdown; derm	Eye: Skin: Breath: Swallow:	Irr immed Molten: flush immed/ Sol-Liq: soap wash prompt Resp support Medical attention immed	Eyes, blood, liver, kidneys, skin, RBC, CNS
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench		NIOSH §: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBA	Inh Abs Ing Con	Derm: hemorrhagic cystitis; dysp, ataxia, methemoglobinemia; hema; dysuria; [carc]	Eye: Skin: Breath: Swallow:	Irr immed (15 min) Soap wash immed Resp support Medical attention immed	Bladder, skin
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench		NIOSH §: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBA	Inh Abs Con Ing	Derm: hemorrhagic cystitis; dysp; ataxia; methemoglobinemia, hema; dysuria; [carc]	Eye: Skin: Breath: Swallow:	Irr immed (15 min) Soap wash immed Resp support Medical attention immed	Bladder, skin

beta-Naphthylamine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Nickel carbonyl (as Ni) Ni(CO) ₄ 13463-39-3 QR6300000	Nickel tetracarbonyl	NIOSH Ca See Appendix A 0.001 ppm (0.007 mg/m ³) OSHA 0.001 ppm (0.007 mg/m ³)	Ca [7 ppm]	Colorless to yellow liquid with a musty odor. [Note: A gas above 110°F.]	MW: 170.7 BP: 110°F Sol: 0.05% FLP: <-4°F IP: 8.28 eV	VP: 315 mm FRZ: -13°F UEL: 7 LEL: 2%	Nitric acid, bromine, chlorine & other oxidizers; flammable materials	Char(low Ni); HNO ₃ ; HGA; III [#6007]
1259 28	1 ppm = 7.10 mg/m ³				Sp.Gr(63°F): 1.32 Class IB Flammable Liquid			
Nickel metal and other compounds (as Ni) Ni 7440-02-0 (Metal) QR5950000 (Metal)	Metal: Elemental nickel Synonyms of other compounds vary depending upon the specific compound.	NIOSH Ca See Appendix A 0.015 mg/m ³ OSHA 0.1 mg/m ³ (soluble cmpds) 1 mg/m ³ (metal & insoluble cmpds)	Ca [N.E.]	Metal: Lustrous, silvery solid.	MW: 58.7 BP: 5139°F Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 2831°F UEL: NA LEL: NA	Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate	Filter; Acid; ICP; III [#7300, Elements]
Sp.Gr: 8.90 Noncombustible Solid in bulk form.								
Nicotine C ₁₀ H ₁₄ NC ₂ H ₇ NCH ₃ 54-11-5 QS5250000	3-(1-Methyl-2-pyrrolidyl)pyridine	NIOSH/OSHA 0.5 mg/m ³ [skin]	35 mg/m ³	Pale-yellow to dark brown liquid with a fish-like odor when warm. [insecticide]	MW: 162.2 BP: 482°F (Decomposes) Sol: Miscible FLP: 203°F IP: 8.01 eV	VP: 0.08 mm FRZ: -110°F UEL: 4.0% LEL: 0.7%	Strong oxidizers, strong acids	XAD-2; Ethyl acetate; GC(AIc-FID); II(3) [#S293]
1654 55	1 ppm = 6.74 mg/m ³				Sp.Gr: 1.01 Class IIIB Combustible Liquid			
Nitric acid HNO ₃ 7697-37-2 QU5775000	Aqua fortis, Engravers acid, Hydrogen nitrate, Red fuming nitric acid (RFNA), White fuming nitric acid (WFNA)	NIOSH/OSHA 2 ppm (5 mg/m ³) ST 4 ppm 10 mg/m ³	100 ppm	Colorless, yellow, or red fuming liquid with an acid, sulfocating odor. [Note: Often used in an aqueous solution. Fuming nitric acid is concentrated nitric acid that contains dissolved nitrogen.]	MW: 63.0 BP: 181°F Sol: Miscible FLP: NA IP: 11.95 eV	VP: 48 mm FRZ: -44°F UEL: NA LEL: NA	Combustible materials, metallic powders, hydrogen sulfide, carbides, alcohols [Note: Reacts with water to produce heat. Corrosive to metals.]	Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids]
1760 60 (<40% acid soln) 2031 44 (>40% acid soln) 2032 44 (fuming)	1 ppm = 2.62 mg/m ³				Sp.Gr(77°F): 1.50 Noncombustible Liquid, but increases the flammability of combustible materials.			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection – maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: N.R. Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Sens derm, allergic asthma, pneumitis; [carc]	Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Nasal cavities, lungs, skin
Clothing: Any poss Goggles: Any poss Wash: Immed wet Change: N.R. Remove: Immed wet (flamm)	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Head, vert; nau, vomit, epigastric pain; substernal pain; cough, hyperpnea; cyan; weak; leucyt, pneuirts; delirium, convuls; [carc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Lungs, paranasal sinus, CNS
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 5 mg/m ³ : SA/SCBA 12.5 mg/m ³ : SA,CF* 25 mg/m ³ : SCBAF/SAF/SAT,CF* 35 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Nau, saliv, abdom pain, vomit, diarr; head, dizz, disturb hearing, vision; conf, weak, inco; paroxysmal atrial fibr; convuls, dysp	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	CNS, CVS, lungs, GI tract
Clothing: Any poss pH <2.5/Repeat pH >2.5 Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: pH <2.5: Eyewash, quick drench	NIOSH/OSHA 50 ppm: SA,CF* 100 ppm: SCBAF/SAF/GMFS+CCRF§ §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS+SCBAE	Inh Ing Con	Irrit eyes, muc memb, skin; delayed pulm edema, pneumitis, bron; dental erosion	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Eyes, resp sys, skin, teeth

Nitric acid

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Nitric oxide NO 10102-43-9 QX0525000	Mononitrogen monoxide, Nitrogen monoxide	NIOSH/OSHA 25 ppm (30 mg/m ³)	100 ppm	Colorless gas.	MW: 30.0 BP: -241°F Sol: 5% FLP: NA IP: 9.27 eV	VP: >1 atm FRZ: -263°F UEL: NA LEL: NA	Combustible materials, ozone, chlorinated hydrocarbons, ammonia, carbon disulfide, metals, fluorine [Note: Reacts with water to form nitric acid.]	Mol-sieve [®] ; Reagent; Vis; III(1) [PACAM #231]
1660 20	1 ppm = 1.25 mg/m ³				Nonflammable Gas, but will accelerate the burning of combustible materials.			
p-Nitroaniline NO ₂ C ₆ H ₄ NH ₂ 100-01-6 BY7000000	para-Aminonitrobenzene, 4-Nitroaniline, 4-Nitrobenzylamine, p-Nitrophenylamine, PNA	NIOSH/OSHA 3 mg/m ³ [skin]	300 mg/m ³	Bright yellow, crystalline powder with a slight ammonia-like odor.	MW: 138.1 BP: 630°F Sol: 0.08% FLP: 390°F IP: 8.85 eV	VP(288°F): 1 mm MLT: 295°F UEL: ? LEL: ?	Strong oxidizers, strong reducers [Note: May result in spontaneous heating of organic materials in the presence of moisture.]	Filter; 2-Propanol; HPLC/UV/D; III(5) [#57]
1661 55					Sp.Gr: 1.42 Combustible Solid			
Nitrobenzene C ₆ H ₅ NO ₂ 98-95-3 DA6475000	Essence of mirbane, Nitrobenzol, Oil of mirbane	NIOSH/OSHA 1 ppm (5 mg/m ³) [skin]	200 ppm	Yellow, oily liquid with a pungent odor like paste shoe polish. [Note: A solid below 42°F.]	MW: 123.1 FRZ: 411°F Sol: 0.2% FLP: 190°F IP: 9.92 eV	VP(112°F): 1 mm FRZ: 42°F UEL: ? LEL(200°F): 1.6%	Concentrated nitric acid, nitrogen tetroxide, caustics, phosphorus pentachloride, chemically-active metals such as tin or zinc	SI gel; Methanol; GC/FID; III [#2005]
1662 55	1 ppm = 5.12 mg/m ³				Sp.Gr: 1.20 Class IIIA Combustible Liquid			
4-Nitrobiphenyl C ₆ H ₄ C ₆ H ₄ NO ₂ 92-93-3 DV5600000	p-Nitrobiphenyl, p-Nitrodiphenyl, 4-Nitrodiphenyl, 4-Phenylnitrobenzene, p-Phenylnitrobenzene, PNB	NIOSH Ca See Appendix A OSHA (1910.1003) See Appendix B ACGIH A1	Ca	White to yellow, needle-like crystalline solid with a sweetish odor.	MW: 199.2 BP: 644°F Sol: Insoluble FLP: 290°F IP: ?	VP: ? MLT: 237°F UEL: ? LEL: ?	Strong reducers	Filter/ SI gel(2); 2-Propanol; GC/FID; III(4) [PACAM #273]
					Combustible Solid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 5)		Target organs (See Table 5)
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 100 ppm: SA,CF*/PAPRS*/SA*/ SCBA*/CCRFS*/GMFS* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS*/SCBAE	Inh Con	Irrit eyes, nose, throat; drow; unconscious	Breath:	Resp support	Resp sys
Clothing: Repeat Goggles: Reason prob Wash: Immed contam/daily Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Quick drench	NIOSH/OSHA 30 mg/m ³ : SA*/SCBA* 75 mg/m ³ : SA,CF* 150 mg/m ³ : SCBAF/SAF 300 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVDMFu/SCBAE	Inh Abs Ing Con	Cyan, ataxia; tacar, tachypnea; dysp; irrity; vomit, diarr; convuls; resp arrest; anemia; methemoglobinemia	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Blood, heart, lungs, liver
Clothing: Any poss Goggles: Reason prob Wash: N.R. Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Quick drench	NIOSH/OSHA 10 ppm: CCROV*/SA*/SCBA* 25 ppm: SA,CF*/PAPROV* 50 ppm: CCRFOV/GMFOV/SCBAF/SAF 200 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Anoxia; irrit eyes; derm; anemia; in animals: liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Blood, liver, kidneys, CVS, skin
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Head, lethargy, dizz; dysp; ataxia, weak; methemoglobinemia; urinary burning; acute hemorrhagic cystitis; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Bladder, blood

4-Nitrobiphenyl

Chemical name, structure-formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, Flammability	VP, FRZ UEL, LEL		
p-Nitrochlorobenzene C ₆ H ₄ ClNO ₂ 100-00-5 CZ1050000	p-Chloronitrobenzene, 4-Chloronitrobenzene, 1-Chloro-4-nitrobenzene, PCNB, PCNB	NIOSH Ca See Appendix A [skin] OSHA 1 mg/m ³ [skin]	Ca [1000 mg/m ³]	Yellow crystalline solid with a sweet odor.	MW: 157.6 BP: 468°F Sol: Insoluble FLP: 261°F IP: 9.96 eV	VP: ? MLT: 182°F UEL: ? LEL: ?	Strong oxidizers	Si gal; Methanol; GC/FID; III [#2005, Nitro- benzenes]
1578 55					Sp.Gr: 1.52 Solid that does not burn, or burns with difficulty.			
Nitroethane CH ₃ CH ₂ NO ₂ 79-24-3 K15600000	None	NIOSH/OSHA 100 ppm (310 mg/m ³)	1000 ppm	Colorless, oily liquid with a mild, fruity odor.	MW: 75.1 BP: 237°F Sol: 5% FLP: 82°F IP: 10.88 eV	VP: 16 mm FRZ: -130°F UEL: ? LEL: 3.4%	Amines; strong acids, alkalis & oxidizers; hydrocarbons; combustibles; metal oxides	XAD-2(2); Etnyl acetate; GC/FID; III [#2526]
2842 26	1 ppm = 3.12 mg/m ³				Sp.Gr: 1.05 Class IC Flammable Liquid			
Nitrogen dioxide NO ₂ 10102-44-0 OW9800000	Dinitrogen tetroxide, Nitrogen peroxide, Nitrogen tetroxide, NTO	NIOSH/OSHA 5T 1 ppm (1.8 mg/m ³)	50 ppm	Yellowish-brown liquid or reddish-brown gas (above 70°F) with a pungent, acid odor. [Note: In solid form (below 15°F) it is found structurally as N ₂ O ₄ .]	MW: 46.0 BP: 70°F Sol: Reacts FLP: NA IP: 9.75 eV	VP: 720 mm FRZ: 13°F UEL: NA LEL: NA	Combustible material, water, chlorinated hydrocarbons, carbon disulfide, ammonia, [Note: Reacts with water to form nitric acid.]	Palmas Tube; Reagent; Vis; III [#6700]
1067 20	1 ppm = 1.91 mg/m ³				Sp.Gr: 1.44 (Liquid at 68°F) Noncombustible Liquid/Gas, but will accelerate the burning of combustible materials.			
Nitrogen trifluoride NF ₃ 7783-54-2 OX1925000	Trifluoramine, Trifluorammonia	NIOSH/OSHA 10 ppm (29 mg/m ³)	2000 ppm	Colorless gas with a moldy odor. [Note: Shipped as a liquefied compressed gas.]	MW: 71.0 BP: 200°F Sol: Insoluble FLP: NA IP: 12.97 eV	VP: >1 atm FRZ: -340°F UEL: NA LEL: NA	Water, oil, greases, oxidizable materials, ammonia, carbon monoxide, methane, hydrogen, hydrogen sulfide, activated charcoal, diborane	None available
2451 15	1 ppm = 2.95 mg/m ³				Nonflammable Gas			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Reason prob Goggles: Reason prob Wash: Immed wet/Prompt contaminatedaily Change: After work if reason prob contam Remove: Immed non-imperv wet/ Prompt non-imperv contam Provide: Quick drench		NIOSH Y: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Anoxia; unpleasant taste; mild anemia; [carc] in animals: hema, hemog	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Blood, liver, kidneys, CVS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: SCBAE	Inh Con Ing	Derm: in animals: lac; dysp, pulm rales, edema; liver, kidney inj; narco	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Skin
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench		NIOSH/OSHA 25 ppm: SA-CF [†] 50 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Cough, mucoid frothy sputum, dysp; chest pain; pulm edema, cyan, tachypnea, tacar; eye irrit	Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed	Resp sys, CVS
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH/OSHA 100 ppm: SA/SCBA/CCRS 250 ppm: SA-CF/PAPRS 500 ppm: SCBAF/SAF/CCRFSGMFS/ SAT-CF [†] /PAPRTS [†] 2000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh	In animals: methemoglobin; anoxia, cyan; weak, dizz, head; liver, kidney inj	Breath: Resp support	In animals: blood

Nitrogen trifluoride

Chemical name, structure-formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Nitroglycerine CH ₂ NO ₂ CHNO ₂ CH ₂ NO ₂ 55-63-0 QX2100000	Glyceril trinitrate; NG; 1,2,3-Propanetriol trinitrate; Trinitroglycerine	NIOSH/OSHA ST 0.1 mg/m ³ [skin] [Note: OSHA stayed the start-up date for the PEL on 12/6/89 for the explosives industry until 2/1/90.]	500 mg/m ³	Colorless to pale- yellow, viscous liquid or solid (below 56°F). [Note: An explosive ingredient in dyn- amite (20-40%) with ethylene glycol dinitrate (60-60%.)]	MW: 227.1 BP: Begins to decompose at 122-140°F Sol: 0.1% Fl.P: Explodes IP: ? Sp.Gr: 1.60 Class IIIB Combustible Liquid	VP: 0.0003 mm FRZ: 56°F UEL: ? LEL: ?	Heat, ozone, shock, acids	Tenax GC; Ethanol; GC/ECD; III; [#2507]
3064 26 Nitromethane CH ₃ NO ₂ 75-52-5 PA9800000	Nitrocarbol	NIOSH See Appendix D OSHA 100 ppm (250 mg/m ³)	1000 ppm	Colorless, oily liquid with a disagreeable odor.	MW: 61.0 BP: 214°F Sol: 10% Fl.P: 95°F IP: 11.08 eV Sp.Gr: 1.14 Class IC Flammable Liquid	VP: 28 mm FRZ: -20°F UEL: ? LEL: 7.3%	Amines; strong acids, alkalis & oxidizers; hydrocarbons & other combustible materials; metallic oxides [Note: Slowly corrodes steel & copper when wet.]	Chrom-106; Ethyl acetate; GC/FPD; III [#2527]
1261 26 1-Nitropropane CH ₃ CH ₂ CH ₂ NO ₂ 108-03-2 TZ5075000	Nitropropane, 1-NP	NIOSH/OSHA 25 ppm (90 mg/m ³)	2300 ppm	Colorless liquid with a somewhat disagreeable odor.	MW: 89.1 BP: 269°F Sol: 1% Fl.P: 96°F IP: 10.81 eV Sp.Gr: 1.00 Class IC Flammable Liquid	VP: 8 mm FRZ: -162°F UEL: ? LEL: 2.2%	Amines; strong acids, alkalis & oxidizers; hydrocarbons & other combustible materials; metal oxides	XAD-4; CS ₂ ; GC/NPO; OSHA [#46]
2608 26 2-Nitropropane CH ₃ CH(NO ₂)CH ₃ 79-46-9 TZ5250000	Dimethylnitromethane, sec-Nitropropane, iso-Nitropropane, 2-NP	NIOSH Ca See Appendix A Reduce exposure to lowest feasible concentration. OSHA 10 ppm (35 mg/m ³)	Ca (2300 ppm) ACGIH C 10 ppm, A2 (35 mg/m ³)	Colorless liquid with a pleasant, fruity odor.	MW: 89.1 BP: 249°F Sol: 2% Fl.P: 75°F IP: 10.71 eV Sp.Gr: 0.99 Class IC Flammable Liquid	VP: 13 mm FRZ: -135°F UEL: 11.0% LEL: 2.6%	Amines; strong acids, alkalis & oxidizers, metal oxides, combustible materials	Chrom-106; Ethyl acetate; GC/FID; III [#2528]
2608 26	1 ppm = 3.70 mg/m ³							

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Any poss Goggles: Reason prob Wash: Immed contam Change: After work if any poss contam Remove: Immed wet (flamm) Provide: Quick drench		NIOSH/OSHA 1 mg/m ³ : SA*/SCBA* 2.5 mg/m ³ : SA/CF* 5 mg/m ³ : SCBAF/SAF/SAT:CF* 200 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Throb head; dizz; nau, vomit, abdom pain; hypotension; flush; palp; methemoglobin; delirium, depres CNS; angina; skin irrit	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Immed Resp support Medical attention immed	CVS, blood, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		OSHA 1000 ppm: SA,CF*/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP-ASCBA Escape: SCBAE	Inh Con Ing	Derm	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin
Clothing: N.R. Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 250 ppm: SA*/SCBA* 625 ppm: SA,CF* 1250 ppm: SCBAF/SAF 2300 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP-ASCBA Escape: SCBAE	Inh Con Ing	Eye irrit, head, nau, vomit, diarr	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, CNS
Clothing: N.R. Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed wet (flamm)		NIOSH Y: SCBAF:PD,PP/SAF:PD,PP-ASCBA Escape: SCBAE	Inh Con Ing	Head, anor, nau, vomit, diarr, irrit resp sys, [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, CNS

2-Nitropropane

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr., flammability	VP, FRZ, UEL, LEL		
N-Nitrosodimethylamine (CH ₃) ₂ N ₂ O 62-75-9 100525000	Dimethylnitrosamine; N,N-Dimethylnitrosamine; OMNA; N-Methyl-N-nitrosomethanamine; NDMA; N-Nitrosodimethylamine	NIOSH Ca See Appendix A OSHA [1910.1016] See Appendix B ACGIH A2 [skin]	Ca	Yellow, oily liquid with a faint, characteristic odor.	MW: 74.1 BP: 306°F Sol: Soluble FLP: 7 IP: 8.69 eV	VP: 3 mm FRZ: 7 UEL: 7 LEL: 7	Strong oxidizers [Note: Should be stored in dark bottles.]	T-Sorb; Methanol; CH ₂ Cl ₂ ; GC/FID; II [#2522]
Nitrotoluene NO ₂ C ₆ H ₄ CH ₃ o: 88-72-2 XT3150000 m: 99-08-1 XT2975000 p: 99-99-0 XT3325000 1664 55	Methyl nitrobenzene, Nitrotoluol o: ortho-Nitrotoluene 2-Nitrotoluene m: meta-Nitrotoluene 3-Nitrotoluene p: para-Nitrotoluene 4-Nitrotoluene	NIOSH/OSHA 2 ppm (11 mg/m ³) [skin]	200 ppm	Yellow liquids (o-, m-isomers) or crystalline solid (p-isomer) with a weak, aromatic odor.	MW: 137.1 BP: 432/450/ 460°F Sol: 0.07; 0.05/0.04% FLP: 223/232/ 223°F IP: 9.43/9.48/9.50 eV Sp.Gr: 1.16/1.16/1.12 Class III B Combustible Liquids	VP (122°F): 1/1/1 mm FRZ/MLT: 25-59/128°F UEL: 7 LEL: 7	Strong oxidizers, sulfuric acid	Si gel; Methanol; GC/FID; II [#2005, Nitro- benzenes]
Octachloronaphthalene C ₁₀ Cl ₈ 2234-13-1 OK0250000	Halowax® 1051; 1,2,3,4,5,6,7,8- Octachloronaphthalene; Parchloronaphthalene	NIOSH/OSHA 0.1 mg/m ³ ST 0.3 mg/m ³ [skin]	Unknown	Waxy, pale-yellow solid with an aromatic odor.	MW: 403.7 BP: 824°F Sol: Insoluble FLP: NA IP: 7	VP: 7 MLT: 378°F UEL: NA LEL: NA	Strong oxidizers	Filter; Hexane; GC/FID; II(2) [#597]
Octane CH ₃ (CH ₂) ₆ CH ₃ 111-65-9 RG8400000 1262 27	n-Octane, normal-Octane	NIOSH 75 ppm (350 mg/m ³) C 385 ppm (1800 mg/m ³) (15-min) OSHA 300 ppm (1450 mg/m ³) ST 375 ppm (1800 mg/m ³)	5000 ppm	Colorless liquid with a gasoline-like odor.	MW: 114.2 BP: 256°F Sol: Insoluble FLP: 56°F IP: 9.82 eV	VP: 10 mm FRZ: -70°F UEL: 6.5% LEL: 1.0%	Strong oxidizers	Char; CS ₂ ; GC/FID; II [#1500, Hydro- carbons]
	1 ppm = 4.75 mg/m ³				Sp.Gr: 0.70 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH V: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Nau, vomit, diarr, abdom cramps; head; fever; enlarged liver, jaun; reduced function of liver, kidneys, lungs; [canc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Liver, kidneys, lungs
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 20 ppm: SA*/SCBA* 50 ppm: SA:CF* 100 ppm: SCBAF/SAF/SAT:CF* 200 ppm: SAF:PD,PP ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Anoxia, cyan; head, weak, dizz; ataxia; dypsp; tacar; nau, vomit	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Blood, CNS, CVS, skin, GI tract
Clothing: Any poss molt/ Reason prob sol-liq Goggles: Any poss molt/ Reason prob sol-liq Wash: Prompt contam/daily Change: After work if reason prob contam Remove: Immed non-imperv contam molt/ Prompt non-imperv contam sol-liq	NIOSH/OSHA 1 mg/m ³ : SA/SCBA ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Acne-form derm; liver damage, jaun	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Skin, liver
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH 750 ppm: SA*/SCBA* 1875 ppm: SA:CF* 3750 ppm: SCBAF/SAF 5000 ppm: SAF:PD,PP ‡: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Con Ing	Irrit eyes, nose; drow; derm; chemical pneu	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Skin, eyes, resp sys

Octane

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr., flammability	VP, FRZ, UEL, LEL		
Oil mist (mineral) 8012-95-1 PY800000	Heavy mineral oil mist, Paraffin oil mist, White mineral oil mist	NIOSH 5 mg/m ³ ST 10 mg/m ³ OSHA 5 mg/m ³	N.E.	Colorless, oily liquid aerosol dispersed in air. [Note: Has an odor like burned lubricating oil.]	MW: Varies BP: 680°F Sol: Insoluble FLP (bc): 375-500°F IP: ? Sp.Gr: 0.90 Class IIIB Combustible Liquid	VP: ? FRZ: ? UEL: ? LEL: ?	None reported	Filter: CFC-113; IR; II [#5026]
Osmium tetroxide (as Os) 20816-13-0 RN1140000	Osmic acid anhydride, Osmium oxide	NIOSH/OSHA 0.002 mg/m ³ (0.0002 ppm) ST 0.006 mg/m ³ (0.0006 ppm)	1 mg/m ³	Colorless, crystalline solid or pale-yellow mass with an unpleasant, acrid, chlorine-like odor. [Note: A liquid above 105°F.]	MW: 254.2 BP: 266°F Sol(77°F): 6% FLP: NA IP: 12.60 eV Sp.Gr: 5.10 Noncombustible Solid	VP(B1*): 11 mm MLT: 155°F UEL: NA LEL: NA	Hydrochloric acid, easily oxidized organic materials [Note: Begins to sublime below BP.]	None available
OsO ₄ 2471 55								
Oxalic acid HOOCOOH·2H ₂ O 144-62-7 R02450000	Ethanedioic acid, Oxalic acid (aqueous), Oxalic acid dihydrate	NIOSH/OSHA 1 mg/m ³ ST 2 mg/m ³	500 mg/m ³	Colorless, odorless powder or granular solid. [Note: The anhydrous form (COOH) ₂ is an odorless, white solid.]	MW: 126.1 BP: Sublimes Sol: 14% FLP: ? IP: ? Sp.Gr: 1.65 Combustible Solid	VP: <0.001 mm MLT: 373°F (Sublimes) UEL: ? LEL: ?	Strong oxidizers, silver compounds	None available
2449 54								
Oxygen difluoride OF ₂ 7783-41-7 RS2100000	Difluorine monoxide, Fluorine monoxide, Oxygen fluoride	NIOSH/OSHA C 0.05 ppm (0.1 mg/m ³)	0.5 ppm	Colorless gas with a peculiar, foul odor.	MW: 54.0 BP: -230°F Sol: 0.02% FLP: NA IP: 13.11 eV	VP: >1 atm FRZ: -371°F UEL: NA LEL: NA	Combustible materials, chlorine, bromine, iodine, platinum, metal oxides, moist air, hydrogen sulfide, hydrocarbons, water [Note: Reacts very slowly with water to form hydrofluoric acid.]	None available
2190 20	1 ppm = 2.24 mg/m ³				Nonflammable Gas, but a strong oxidizer.			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: N.R. Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet		NIOSH/OSHA 50 mg/m ³ : SA/SCBA/HIE 125 mg/m ³ : SA,CF/PAPR/HIE 250 mg/m ³ : HIEF/PAPR/HIE/SAT:CF/ SCBAF/SAF 2500 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh	None reported	Skin: Breath: Soap wash Fresh air	Resp sys, skin
Clothing: Reason prob Goggles: Any poss Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam Provide: Eyewash		NIOSH/OSHA 0.1 mg/m ³ : SCBAF/SAF/CCRFSHIE/ GMFSHIE 1 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFSHIE/SCBAE	Inh Ing Con	Lac, vis dist, conj; head; cough; dysp; derm	Eye: Skin Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Eyes, resp sys, skin
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam		NIOSH/OSHA 25 mg/m ³ : PAPRDM/SA,CF† 50 mg/m ³ : HIEF/SCBAF/SAF 500 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Irrit eyes, muc memb, skin; eye burns; local pain, cyan; shock, collapse, convuls	Eye: Skin: Breath: Swallow: Irr immed Water flush prompt Resp support Medical attention immed	Resp sys, skin, kidneys, eyes
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH/OSHA 0.5 ppm: SCBA/SA §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Con	Intractable head; resp sys irrit, pulm edema; eye, skin burns	Eye: Skin: Breath: Irr immed Water flush immed Resp support	Lungs, eyes

Oxygen difluoride

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, Flammability	VP, FRZ UEL, LEL		
Ozone O_3 10028-15-6 RS8225000	Triatomic oxygen	NIOSH C 0.1 ppm (0.2 mg/m ³) OSHA 0.1 ppm (0.2 mg/m ³) ST 0.3 ppm (0.6 mg/m ³)	10 ppm	Colorless to blue gas with a very pungent odor.	MW: 48.0 BP: -169°F Sol: Insoluble FLP: NA IP: 12.52 eV	VP: >1 atm FRZ: -315°F UEL: NA LEL: NA	All oxidizable materials (both organic & inorganic)	Imp; Reagent; Vis; IR1 P&CAM #154
	1 ppm = 2.00 mg/m ³				Nonflammable Gas, but a powerful oxidizer.			
Paraquat (CH ₃) ₂ C ₆ H ₄ N ₂ CH ₂ ·2Cl 1910-42-5 DW2275000	1,1'-Dimethyl-4,4'-bipyridinium dichloride; N,N'-Dimethyl-4,4'-bipyridinium dichloride; Paraquat chloride; Paraquat dichloride	NIOSH/OSHA 0.1 mg/m ³ [skin]	1.5 mg/m ³	Yellow solid with a faint ammonia-like odor. [herbicide] [Note: Paraquat may also be found commercially as a methyl sulfate salt C ₁₂ H ₁₄ N ₂ ·2CH ₃ SO ₄]	MW: 257.2 BP: 347-356°F (Decomposes) Sol: Miscible FLP: NA IP: ?	VP: Low MLT: ? UEL: NA LEL: NA	Strong oxidizers, alkylaryl-sulfonate wetting agents [Note: Corrosive to metals. Decomposes in presence of ultraviolet light.]	Filter; Water; HPLC/UV/D; IR #5003
2588 53 (solid pesticides)					Sp.Gr: 1.24 Noncombustible Solid			
Parathion (C ₂ H ₅ O) ₂ P(SiOC ₂ H ₅) ₂ NO ₂ 56-38-2 TF4550000	O,O-Diethyl-O(p-nitrophenyl) phosphorothioate; Diethyl parathion; Ethyl parathion; Parathion-ethyl	NIOSH 0.05 mg/m ³ [skin] OSHA 0.1 mg/m ³ [skin]	20 mg/m ³	Pale-yellow to dark brown liquid with a garlic-like odor. [Note: A solid below 43°F. Pesticide that may be absorbed on a dry carrier.]	MW: 291.3 BP: 707°F Sol: 0.001% FLP: ? IP: ?	VP: 0.00004 mm FRZ: 43°F UEL: ? LEL: ?	Strong oxidizers	Filter; Isocetane; GC/FPD; IR #5012
2783 55 (liquid/dry)	1 ppm = 12.11 mg/m ³				Sp.Gr: 1.27 Combustible Liquid, but may be difficult to ignite.			
Pentaborane B ₅ H ₉ 19624-22-7 RY9925000	Pentaboron nonahydride, Stable pentaborane	NIOSH/OSHA 0.005 ppm (0.01 mg/m ³) ST 0.015 ppm (0.03 mg/m ³)	3 ppm	Colorless liquid with a pungent odor like sour milk.	MW: 63.1 BP: 140°F Sol: Reacts FLP: 86°F IP: 9.90 eV	VP(77°F): 200 mm FRZ: -52°F UEL: ? LEL: 0.42%	Oxidizers, halogens, water, halogenated hydrocarbons [Note: May ignite SPONTANEOUSLY in moist air. Corrosive to natural rubber. Hydrolyzes slowly with heat in water to form boric acid.]	None available
1380 75	1 ppm = 2.62 mg/m ³				Sp.Gr: 0.62 Class IC Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.		NIOSH/OSHA 1 ppm: SA/SCBA/CCRS ¹ 2.5 ppm: SA-CF/PAPRS ¹ 5 ppm: CCRFS ¹ /GMFS ¹ /SCBAF/SAF/ SAT-CF 10 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS ¹ /SCBAE	Inh	Irrit eyes, muc memb; pulm edema; chronic resp disease	Eye: Breath:	Medical attention Fresh air, 100% O ₂	Eyes, resp sys
Clothing: Reason prob Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Quick drench		NIOSH/OSHA 1 mg/m ³ : CCROVDMFu ¹ /SA ¹ /SCBA ¹ 1.5 mg/m ³ : CCRFOVDMFu/SA-CF ¹ / SCBAF/SAF/PAPROVDMFu ¹ §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, epis; derm; fingernail damage; Irrit GI tract; heart, liver, kidney damage; acute pulm inflam	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Eyes, resp sys, heart, liver, kidneys, GI tract
Clothing: Repeat Goggles: Any poss Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench		NIOSH 0.5 mg/m ³ : CCROVDMFu ¹ /SA/SCBA 1.25 mg/m ³ : SA-CF/PAPROVDMFu 2.5 mg/m ³ : CCROVHIE/SCBAF/SAF/ PAPROVHIE/SAT-CF 20 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Miosis; rhin; head; tight chest, wheez, lar spasm, saliv, cyan; anor, nau, vomit, abdom cramps, diarr; sweat; musc fasc, weak, para; gidd, conf, ataxia; convuls, coma; low BP; card irregularities; skin, eye irrit	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, CNS, CVS, eyes, skin, blood chol
Clothing: Reason prob Goggles: Any poss Wash: Immed wet Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench		NIOSH/OSHA 0.05 ppm: SA/SCBA 0.125 ppm: SA-CF 0.25 ppm: SCBAF/SAF/SAT-CF 3 ppm: SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Dizz, head, drow, li-head; Inco, tremor, tonic spasm Ing face, neck, abdom, limbs; convuls; irrit eyes, skin	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	CNS, eyes, skin

Pentaborane

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Pentachloronaphthalene $C_{10}H_7Cl_5$ 1321-64-8 OK0300000	Halowax® 1013; 1,2,3,4,5-Pentachloro- naphthalene	NIOSH/OSHA 0.5 mg/m ³ [skin]	Unknown	Pale yellow or white solid or powder with an aromatic odor.	MW: 300.4 BP: 636°F Sol: Insoluble FLP: 180°F IP: ?	VP: <1 mm MLT: 335°F UEL: ? LEL: ?	Strong oxidizers	Filter/Bub; Isocotane; GC/ECD; IIC2) [#598]
					Sp.Gr: 1.73 Combustible Solid			
Pentachlorophenol C_6Cl_5OH 87-86-5 SM6300000	PCP; Penta; 2,3,4,5,6-Pentachlorophenol	NIOSH/OSHA 0.5 mg/m ³ [skin]	150 mg/m ³	Colorless to white, crystalline solid with a benzene-like odor. [fungicide]	MW: 266.4 BP: 588°F Sol: 0.001% FLP: NA IP: NA	VP: 0.0001 mm MLT: 374°F UEL: NA LEL: NA	Strong oxidizers	Filter/Bub; Methanol; HPLC/UV/D; III [#5512]
2020 53					Sp.Gr: 1.98 Noncombustible Solid			
n-Pentane $CH_3(CH_2)_3CH_3$ 109-66-0 RZ9450000	Pentane, normal-Pentane	NIOSH 120 ppm (350 mg/m ³) C 610 ppm (1800 mg/m ³) [15-min]	15,000 ppm [LEL]	Colorless liquid with a gasoline- like odor. [Note: A gas above 97°F. May be utilized as a fuel.]	MW: 72.2 BP: 97°F Sol: 0.04% FLP: -57°F IP: 10.34 eV	VP(65°F): 400 mm FRZ: -202°F UEL: 7.8% LEL: 1.5%	Strong oxidizers	Char; CS ₂ ; GC/FID; III [#1500, Hydro- carbons]
1265 27	1 ppm = 3.00 mg/m ³	OSHA 600 ppm (1800 mg/m ³) ST 750 ppm (2250 mg/m ³)			Sp.Gr: 0.63 Class IA Flammable Liquid			
2-Pentanone $CH_3COCH_2CH_2CH_3$ 107-87-9 SA7875000	Ethyl acetone, Methyl propyl ketone, MPK	NIOSH 150 ppm (530 mg/m ³) OSHA 200 ppm (700 mg/m ³) ST 250 ppm (875 mg/m ³)	5000 ppm	Colorless to water-white liquid with a characteristic acetone-like odor.	MW: 86.1 BP: 215°F Sol: 6% FLP: 45°F IP: 9.39 eV	VP: 16 mm FRZ: -108°F UEL: 8.2% LEL: 1.5%	Oxidizers, bromine trifluoride	Char; CS ₂ ; GC/FID; III [#1300, Ketones I]
1249 26	1 ppm = 3.58 mg/m ³				Sp.Gr: 0.81 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Any poss molt/Repeat sol-liq Goggles: Any poss molt/Reason prob sol-liq Wash: Prompt contam Change: After work if reason prob contam Remove: Immed non-imperv contam molt/ Prompt non-imperv contam sol-liq	NIOSH/OSHA 5 mg/m ³ : SA*/SCBA* §: SCBAF:PD,PP,SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Head, fig, verti, anor; pruritus, acne-form skin eruptions; jaun, liver nec	Eye: Skin: Breath: Swallow:	Irr immed Soap prompt/Molten Flush immed Resp support Medical Attention immed	Skin, liver, CNS
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if any poss contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 5 mg/m ³ : C:ROVDMFu*/SA*/SCBA* 12.5 mg/m ³ : SA,CF*/PAPROVDMFu* 25 mg/m ³ : CCRFOVHIE/SCBAF/SAF 150 mg/m ³ : SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; sneezing, cough; weak, anor, low-wgt; sweat; head, dizz; nau, vomit; dyp, chest pain; high fever; derm	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	CVS, resp sys, eyes, liver, kidneys, skin, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH 1200 ppm: SA/SCBA 3000 ppm: SA:CF 6000 ppm: SCBAF/SAF/SAT:CF 15,000 ppm: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Drow; irrit eyes, nose; derm; chemical pneu	Eye: Skin: Breath: Swallow:	Irr immed Water wash prompt Resp support Medical attention immed	Skin, eyes, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH 1000 ppm: C:ROV*/PAPROV* 1500 ppm: SA*/SCBA* 3750 ppm: SA:CF* 5000 ppm: GMFOV/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, muc memb; head; derm; narco, coma	Eye: Skin: Breath: Swallow:	Irr immed Water flush Resp support Medical attention immed	Resp sys, eyes, skin, CNS

2-Pentanone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Perchloromethyl mercaptan Cl_3CSCI 594-42-3 PB0370000	PMM, Trichloromethane sulfonyl chloride, Trichloromethyl sulfur chloride	NIOSH/OSHA 0.1 ppm (0.8 mg/m ³)	10 ppm	Pale-yellow, oily liquid with an unbearable acrid odor.	MW: 185.9 BP: 297°F (Decomposes) Sol: Insoluble FLP: NA IP: ?	VP: 65 mm FRZ: ? UEL: NA LEL: NA	Alkalis, amines, hot iron, water [Note: Corrosive to most metals.]	None available
1670 55	1 ppm = 7.73 mg/m ³				Sp.Gr: 1.69 Noncombustible Liquid, but will support combustion.			
Perchloryl fluoride ClO_2F 7616-94-6 SD1925000	Chlorine fluoride oxide, Chlorine oxyfluoride, Trioxychlorofluoride	NIOSH/OSHA 3 ppm (14 mg/m ³) ST 6 ppm (28 mg/m ³)	385 ppm	Colorless gas with a characteristic, sweet odor. [Note: Shipped as a liquefied compressed gas.]	MW: 102.5 BP: -52°F Sol: 0.06% FLP: NA IP: 13.60 eV	VP: >1 atm FRZ: -234°F UEL: NA LEL: NA	Combustibles, strong bases, amines, finely divided metals, oxidizable materials, reducing agents, alcohols	None available
1955 15	1 ppm = 4.26 mg/m ³				Nonflammable Gas, but will support combustion.			
Petroleum distillates (naphtha) 8002-05-9 SE7449000	Aliphatic petroleum naphtha, Petroleum naphtha	NIOSH 350 mg/m ³ C 1800 mg/m ³ [15-min] OSHA 400 ppm (1600 mg/m ³)	10,000 ppm	Colorless liquid with a gasoline- or kerosene-like odor. [Note: A mixture of paraffins (C ₇ to C ₁₂) that may contain a small amount of aromatic hydrocarbons.]	MW: 99 (approx) BP: 86-460°F Sol: Insoluble FLP: -40 to -86°F IP: ?	VP: 40 mm (approx) FRZ: 7 UEL: 5.9% LEL: 1.1%	Strong oxidizers	Char; CS ₂ ; GC/FID; III [#1550, Naphthas]
1255 27	1 ppm = 4.11 mg/m ³ (approx)				Sp.Gr: 0.63-0.66 Flammable Liquid			
Phenol $\text{C}_6\text{H}_5\text{OH}$ 108-95-2 SJ3325000	Carbolic acid, Hydroxybenzene, Monohydroxy benzene, Phenyl alcohol, Phenyl hydroxide	NIOSH 5 ppm (19 mg/m ³) C 15.6 ppm (60 mg/m ³) [15-min] [skin] OSHA 5 ppm (19 mg/m ³) [skin]	250 ppm	Colorless to light-pink, crystalline solid with a sweet, acrid odor. [Note: Phenol liquefies by mixing with about 8% water.]	MW: 94.1 BP: 359°F Sol(77°F): 9% FLP: 175°F IP: 8.50 eV	VP: 0.4 mm MLT: 109°F UEL: ? LEL: 1.8%	Strong oxidizers, calcium hypochlorite, aluminum chloride, acids	XAD-7; Methanol; HPLC/UV/D; OSHA [#32]
1671 55 (solid) 2312 55 (molten) 2821 55 (soln)					Sp.Gr: 1.06 Combustible Solid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	NIOSH/OSHA 1 ppm: SA*/SCBA*/CC/ROV* 2.5 ppm: SA,CF*/PAPROV* 5 ppm: CCRFOV/GMFOV/SCBAF/SAF/ SAT,CF*/PAPRTOV* 10 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Lac, eye inflam; irrit nose, throat; cough; dysp, deep breath pain, coarse rales; vomit; pallor, talar; acidosis; anuria	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Eyes, resp sys, liver, kidneys, skin
Clothing: Prevent skin freezing Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed non-imperv contam	NIOSH/OSHA 30 ppm: SA/SCBA 75 ppm: SA,CF* 150 ppm: SCBAF/SAF 385 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS*/SCBAE	Inh Con	Resp irrit; skin burns; in animals: methemoglobin; anoxia; cyan; weak, dizz, head; pulm edema; pneumonia	Eye: Breath:	Irr immed Resp support	Resp sys, skin, blood
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH 850 ppm: SCBA/SA 2125 ppm: SA,CF* 4250 ppm: SCBAF/SAF/SAT,CF* 10,000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Dizz, drow, head, nau; irrit eyes, nose, throat; dry cracked skin	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical Attention immed	Skin, eyes, resp sys, CNS
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if any poss contain Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 50 ppm: CCROVDM/SA/SCBA 125 ppm: SA,CF*/PAPROVDM 250 ppm: SCBAF/SAF/CCRFOVHIE/ GMFOVHIE/PAPRTOVHIE §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; anor, low-wgt; weak; musc ache, pain; dark urine; cyan; liver, kidney damage; skin burns; derm; ochronosis; tremor, convuls, twitch	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Liver, kidneys, skin

Phenol

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr., flammability	VP, FRZ, UEL, LEL		
p-Phenylene diamine $C_6H_4(NH_2)_2$ 106-50-3 SS8050000	4-Amino aniline; 1,4-Benzenediamine; p-Diaminobenzene; 1,4-Diaminobenzene	NIOSH/OSHA 0.1 mg/m ³ [skin]	Unknown	White to slightly red crystalline solid.	MW: 108.2 BP: 513°F Sol: 5% FLP: 312°F IP: 6.89 eV	VP: <1 mm MLT: 285°F UEL: ? LEL: ?	Strong oxidizers	None available
1673 53					Combustible Solid			
Phenyl ether (vapor) $C_6H_5OC_6H_5$ 101-84-8 KN8970000	Diphenyl ether, Diphenyl oxide, Phenoxy benzene, Phenyl oxide	NIOSH/OSHA 1 ppm (7 mg/m ³)	N.E.	Colorless, crystalline solid or liquid (above 92°F) with a peranium-like odor.	MW: 170.2 BP: 498°F Sol: insoluble FLP: 234°F IP: 8.09 eV	VP(77°F): 0.02 mm MLT: 82°F UEL: 1.5% LEL: 0.8%	Strong oxidizers	Char; CS; GC/FID; IIG; [#572]
	1 ppm = 7.08 mg/m ³				Sp.Gr: 1.08 Class IIIB Combustible Liquid			
Phenyl ether-biphenyl mixture (vapor) $C_6H_5OC_6H_4C_6H_5C_6H_5$ 8004-13-5 DV1500000	Diphenyl oxide-diphenyl mixture, Dowtherm® A	NIOSH/OSHA 1 ppm (7 mg/m ³)	N.E.	Colorless to straw-colored liquid or solid (below 54°F) with a disagreeable, aromatic odor. [Note: A mixture typically contains 75% phenyl ether & 25% biphenyl.]	MW: 166(approx) BP: 495°F Sol: insoluble FLP(oc): 255°F IP: ?	VP(77°F): 0.08 mm FRZ: 54°F UEL: ? LEL: ?	Strong oxidizers	Si gel; Benzene; GC/FID; IIG; [#573]
	1 ppm = 6.90 mg/m ³				Sp.Gr(77°F): 1.06 Class IIIB Combustible Liquid			
Phenyl glycidyl ether $C_8H_{10}O_2$ 122-60-1 TZ3675000	1,2-Epoxy-3-phenoxy propane; Glycidyl phenyl ether; PGE; Phenyl 2,3-epoxypropyl ether	NIOSH Ca See Appendix A C 1 ppm (6 mg/m ³) [15-min]	Ca [Unknown]	Colorless liquid. [Note: A solid below 38°F.]	MW: 150.1 BP: 473°F Sol: 0.2% FLP: 248°F IP: ?	VP: 0.01 mm FRZ: 38°F UEL: ? LEL: ?	Strong oxidizers, amines, strong acids, strong bases	Char; CS; GC/FID; IIG; [#574]
	1 ppm = 6.24 mg/m ³	OSHA 1 ppm (6 mg/m ³)			Sp.Gr: 1.11 Class IIIB Combustible Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Reason prob	NIOSH/OSHA 2.5 mg/m ³ : SA:CF ^t 5 mg/m ³ : SCBAF/SAF 25 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFSHIE/SCBAE	Inh	Irrit pharynx, larynx;	Eye:	Irr immed	Resp sys, skin
Goggles:	Reason prob		Abs	bronchial asthma; sens	Skin:	Soap wash prompt	
Wash:	Prompt contam/daily		Ing	derm	Breath:	Resp support	
Change:	Alter work if reason prob contam		Con		Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam						
Clothing:	Repeat	NIOSH/OSHA 25 ppm: SA:CF ^t /PAPROVDM ^t 50 ppm: CCRFOVHIE/GMFOVHIE/ SCBAF/SAF 100 ppm: SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh	Nau; irrit eyes, nose,	Eye:	Irr immed	Eyes, skin, resp sys
Goggles:	Reason prob		Con	skin	Skin:	Soap wash prompt	
Wash:	Prompt contam		Ing		Breath:	Resp support	
Change:	N.R.				Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam						
Clothing:	Repeat	NIOSH/OSHA 25 ppm: SA:CF ^t /PAPROVDM ^t 50 ppm: CCRFOVHIE/GMFOVHIE/ SCBAF/SAF 100 ppm: SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh	Nau; irrit eyes, nose,	Eye:	Irr immed	Eyes, skin, resp sys
Goggles:	Reason prob		Con	skin	Skin:	Soap wash prompt	
Wash:	Prompt contam		Ing		Breath:	Resp support	
Change:	N.R.				Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam						
Clothing:	Any poss	NIOSH ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh	Skin irrit, sens; irrit	Eye:	Irr immed	Skin, eyes, CNS
Goggles:	Reason prob		Con	eyes, upper resp sys;	Skin:	Soap wash prompt	
Wash:	Prompt contam		Ing	narco; [carc]	Breath:	Resp support	
Change:	N.R.				Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam						

Phenyl glycidyl ether

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Phenyldiazine $C_6H_5NHNH_2$ 100-63-0 MW8925000	Hydrazinobenzene, Monophenyldiazine	NIOSH Ca See Appendix A C 0.14 ppm (0.6 mg/m ³) [2-hr] OSHA 5 ppm (20 mg/m ³) ST 10 ppm (45 mg/m ³) [skin]	Ca [295 ppm] ACGIH A2	Colorless to pale- yellow liquid or solid (below 67°F) with a faint, aromatic odor.	MW: 108.1 BP: 470°F (Decomposes) Sol: Slight FLP: 190°F IP: 7.64 eV	VP(161°F): 1 mm FRZ: 67°F UEL: ? LEL: ?	Strong oxidizers, lead dioxide	Bub; Pho-acid; Vis; II(3) [#S160]
2572 53	1 ppm = 4.49 mg/m ³				Sp.Gr: 1.10 Class IIIA Combustible Liquid			
Phosdrin® $C_7H_{13}O_4P_2$ 7786-34-7 G05250000	2-Carbomethoxy-1-methylvinyl dimethyl phosphate, Mevinphos	NIOSH/OSHA 0.01 ppm (0.1 mg/m ³) ST 0.03 ppm (0.3 mg/m ³) [skin]	4 ppm	Pale-yellow to orange liquid with a weak odor. [Note: Insecticide that may be absorbed on a dry carrier.]	MW: 224.2 BP: Decomposes Sol: Miscible FLP(oc): 347°F IP: ?	VP: 0.003 mm FRZ: -69°F UEL: ? LEL: ?	Strong oxidizers [Note: Corrosive to cast iron, some stainless steels, and brass.]	Chrom-102; Toluene; GC/FPD; II [#2503]
2783 55	1 ppm = 9.32 mg/m ³				Sp.Gr: 1.25 Class IIIB Combustible Liquid			
Phosgene $COCl_2$ 75-44-5 S95600000	Carbon oxychloride, Carbonyl chloride, Chloroformyl chloride	NIOSH 0.1 ppm (0.4 mg/m ³) C 0.2 ppm (0.8 mg/m ³) [15-min] OSHA 0.1 ppm (0.4 mg/m ³)	2 ppm	Colorless gas with a suffocating odor like musty hay. [Note: A fuming liquid below 47°F. Shipped as a liquefied compressed gas.]	MW: 98.9 BP: 47°F Sol: Slight FLP: NA IP: 11.55 eV	VP: >1 atm FRZ: -198°F UEL: NA LEL: NA	Moisture [Note: Reacts slowly in water to form hydrochloric acid & carbon dioxide.]	Imp; Reagent; Vis; II(1) [P&CAM #219]
1076 15	1 ppm = 4.11 mg/m ³				Sp.Gr: 1.43 (Liquid at 32°F) Nonflammable Gas			
Phosphine PH_3 7803-51-2 S97525000	Hydrogen phosphide, Phosphorated hydrogen, Phosphorus hydride, Phosphorus trihydride	NIOSH/OSHA 0.3 ppm (0.4 mg/m ³) ST 1 ppm (1 mg/m ³)	200 ppm	Colorless gas with a fish- or garlic- like odor. (pesticide) [Note: Shipped as a liquefied compressed gas. Pure compound is odorless.]	MW: 34.0 BP: -126°F Sol: Slight FLP: NA (Gas) IP: 9.96 eV	VP: >1 atm FRZ: -209°F UEL: ? LEL: ?	Air, oxidizers, chlorine, acids, moisture, halogenated hydrocarbons, copper [Note: May ignite SPONTANEOUSLY on contact with air.]	Sl gel; Reagent; Vis; II(5) [#S332]
2199 18	1 ppm = 1.41 mg/m ³				Flammable Gas			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Any poss	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: SCBAE	Inh Abs Ing Con	Skin sens, hemolytic anemia, dysp, cyan; jaun; kidney damage; vascular thrombosis; [canc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Blood, resp sys, liver, kidneys, skin
Goggles:	Any poss						
Wash:	Immed contam/daily						
Change:	After work if any poss contam						
Remove:	Immed non-imperv contam						
Provide:	Eyewash, quick drench						
Clothing:	Any poss	NIOSH/OSHA 0.1 ppm: SA/SCBA 0.25 ppm: SA,CF 0.5 ppm: SCBAF/SAF/SAT,CF 4 ppm: SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Miosis; rhin; head; tight chest; wheez; lar spasm, saliv, cyan; anor, nau, vomit, abdom cramps, diarr; para; ataxia, convuls; low BP, card irregularities; irrit skin, eyes	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, CNS, CVS, skin, blood chol
Goggles:	Any poss						
Wash:	Immed contam						
Change:	N.R.						
Remove:	Immed non-imperv contam						
Provide:	Eyewash, quick drench						
Clothing:	Reason prob	NIOSH/OSHA 1 ppm: SA*/SCBA* 2 ppm: SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	Irrit eyes; dry burning throat; vomit; cough, foamy sputum, dysp, chest pain, cyan; skin burns	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, skin, eyes
Goggles:	Any poss						
Wash:	Immed contam						
Change:	N.R.						
Remove:	Immed non-imperv contam						
Provide:	Quick drench						
Clothing:	N.R.	NIOSH/OSHA 3 ppm: SA/SCBA 7.5 ppm: SA,CF 15 ppm: SCBAF/SAF/GMFS 200 ppm: SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh	Nau, vomit, abdom pain, diarr; thirst; chest pressure, dysp; musc pain, chills; stupor or syncope	Breath:	Resp support	Resp sys
Goggles:	N.R.						
Wash:	N.R.						
Change:	N.R.						
Remove:	N.R.						

Phosphine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Phosphoric acid H_3PO_4 7664-38-2 TB6300000	Metaphosphoric acid, Orthophosphoric acid, Phosphoric acid (aqueous), White phosphoric acid	NIOSH/OSHA 1 mg/m ³ ST 3 mg/m ³	10,000 mg/m ³	Thick, colorless, odorless, crystalline solid. [Note: Often used in an aqueous solution.]	MW: 98.0 BP: 415°F Sol: Miscible FL.P: NA IP: ?	VP: 0.03 mm MLT: 108°F UEL: NA LEL: NA	Strong caustics, most metals [Note: Readily reacts with metals to form flammable hydrogen gas.]	Si gel; NaHCO ₃ / Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids]
1805 60	1 ppm = 4.07 mg/m ³				Sp.Gr(77°F): 1.87 (Pure) 1.33 (50% soln) Noncombustible Liquid			
Phosphorus (yellow) P_4 7723-14-0 TH3500000	Elemental white phosphorus, White phosphorus	NIOSH/OSHA 0.1 mg/m ³	N.E.	White to yellow, soft, waxy solid with acrid fumes in air. [Note: Usually shipped or stored in water.]	MW: 124.0 BP: 536°F Sol: 0.0003% FL.P: ? IP: ?	VP: 0.03 mm MLT: 111°F UEL: ? LEL: ?	Air, oxidizers including elemental sulfur & strong caustics [Note: Ignites SPONTANEOUSLY in moist air.]	Tenax GC; Xylene; GC/FPD; III [#7905]
1381 38					Sp.Gr: 1.82 Flammable Solid			
Phosphorus pentachloride PCl_5 10026-13-8 TB6125000	Pentachlorophosphorus, Phosphoric chloride, Phosphorus perchloride	NIOSH/OSHA 1 mg/m ³	200 mg/m ³	White to pale-yellow, crystalline solid with a pungent, unpleasant odor.	MW: 208.3 BP: 444.6 Sol: Reacts FL.P: NA IP: ?	VP(132°F): 1 mm MLT: 324°F (Sublimes) UEL: NA LEL: NA	Water, magnesium oxide, chemically-active metals such as sodium & potassium, alkalis [Note: Hydrolyzes in water (even in humid air) to form hydrochloric acid and phosphoric acid. Corrosive to metals.]	Filter/Bub; Reagent; Vis; III(5) [#5257]
1806 39					Noncombustible Solid			
Phosphorus pentasulfide P_2S_5/P_4S_{10} 1314-80-3 TH4375000	Phosphorus persulfide, Phosphorus sulfide	NIOSH/OSHA 1 mg/m ³ ST 3 mg/m ³	750 mg/m ³	Greenish-gray to yellow, crystalline solid with an odor of rotten eggs.	MW: 222.3/ 444.6 BP: 957°F Sol: Reacts FL.P: ? IP: ?	VP(572°F): 1 mm MLT: 550°F UEL: ? LEL: ?	Water, alcohols, strong oxidizers, acids [Note: Reacts with water to form hydrogen sulfide and sulfur dioxide.]	None available
1340 41					Sp.Gr: 2.09 Flammable Solid, which may SPONTANEOUSLY ignite in presence of moisture.			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards					
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)		
Clothing: Any poss >1.6%/Repeat <1.6% Goggles: Any poss Wash: Immed contam Change: After work if reason prob contam sol Remove: Immed non-imperv contam Provide: >1.6%: Eyewash, quick drench	NIOSH/QSHA 25 mg/m ³ : SA,CF* 50 mg/m ³ : SCBAF/SAF/HIEF 2000 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit upper resp tract, eyes, skin; burns skin, eyes; derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush Immed Resp support Medical attention immed	Resp sys, eyes, skin	
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed contam Provide: Eyewash, quick drench	NIOSH/QSHA 1 mg/m ³ : SA 2.5 mg/m ³ : SA,CF† 5 mg/m ³ : SCBAF/SAF 200 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: SCBAE	Inh Ing Con	Irrit eyes, resp tract; abdom pain, nau, jaun; anemia; cachexia; dental pain, excess saliv, jaw pain, swell; burns skin, eyes	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, liver, kidneys, jaw, teeth, blood, eyes, skin	
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/QSHA 10 mg/m ³ : SA/SCBA* 25 mg/m ³ : SA,CF* 50 mg/m ³ : SCBAF/SAF 200 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Ing Con	Irrit eyes, resp sys; bron; derm	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, eyes, skin	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/QSHA 10 mg/m ³ : SA/SCBA* 25 mg/m ³ : SA,CF* 50 mg/m ³ : SCBAF/SAF 750 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFSHIE/SCBAE	Inh Ing Con	Apnea, coma, convuls; irrit eyes, conj pain, lac, photo, kerato-conj, corneal vesic; irrit resp sys; d:z; head; tig; irrity, insom; GI dist	Eye: Skin: Breath: Swallow:	Irr immed Dust off solid; water flush Resp support Medical attention immed	Resp sys, CNS, eyes, skin	

Phosphorus pentasulfide

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Phosphorus trichloride PCl ₃ 7719-12-2 TH3675000	Phosphorus chloride	NIOSH/OSHA 0.2 ppm (1.5 mg/m ³) ST 0.5 ppm (3 mg/m ³)	50 ppm	Colorless to yellow, fuming liquid with an odor like hydrochloric acid.	MW: 137.4 BP: 169°F Sol: Reacts FLP: NA IP: 9.91 eV	VP(70°F): 100 mm FRZ: -170°F UEL: NA LEL: NA	Water, chemically-active metals such as sodium & potassium, aluminum, strong nitric acid, acetic acid, organic matter [Note: Hydrolyzes in water to form hydrochloric acid and phosphoric acid.]	Bub; Reagent; Vis; III [#6402]
1809 39	1 ppm = 5.71 mg/m ³				Sp.Gr: 1.58 Noncombustible Liquid			
Phthalic anhydride C ₈ H ₄ (CO) ₂ O 65-44-9 TI3150000	1,2-Benzenedicarboxylic anhydride; PAN; Phthalic acid anhydride	NIOSH/OSHA 6 mg/m ³ (1 ppm)	10,000 mg/m ³	White solid with a characteristic, acid odor.	MW: 148.1 BP: 563°F Sol: 0.6% FLP: 305°F IP: 10.00 eV	VP(206°F): 1 mm MLT: 267°F UEL: 10.5% LEL: 1.7%	Strong oxidizers, water [Note: Converted to phthalic acid in hot water.]	Filter: NH ₄ OH; HPLC/UVD; II(3) [#5179]
2214 60					Sp.Gr: 1.53 Combustible Solid			
Picric acid C ₆ H ₃ OH(NO ₂) ₃ 88-89-1 TJ7875000	Phenol trinitrate; 2,4,6-Trinitrophenol	NIOSH 0.1 mg/m ³ ST 0.3 mg/m ³ [skin] OSHA 0.1 mg/m ³ [skin]	100 mg/m ³	Yellow, odorless solid. [Note: Usually used as an aqueous solution.]	MW: 229.1 BP: Explodes above 572°F Sol: 1% FLP: 302°F IP: ?	VP(383°F): 1 mm MLT: 252°F UEL: ? LEL: ?	Copper, lead, zinc & other metals; salts; plaster; concrete; ammonia [Note: Corrosive to metals. An explosive mixture results when the aqueous solution crystallizes.]	Filter; Methanol/ Water; HPLC/UVD; II(4) [#6228]
1344 33 (>10% water)	1 ppm = 9.52 mg/m ³				Sp.Gr: 1.76 Class IIIB Combustible Liquid			
Pindone C ₁₂ H ₁₆ O ₂ C(O)C(CH ₃) ₂ 83-26-1 NK6300000	tert-Butyl valone; 1,3-Dioxo-2-pivaloyl-indane; PivalP; Pivalyl; 2-Pivalyl-1,3-indandione	NIOSH/OSHA 0.1 mg/m ³	200 mg/m ³	Bright yellow powder with almost no odor. [insecticide]	MW: 230.3 BP: Decomposes Sol(77°F): 0.602% FLP: ? IP: ?	VP: ? MLT: 230°F UEL: ? LEL: ?	None reported	None available
2472 53					Sp.Gr: 1.06			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 10 ppm: SCBAF/SAF 50 ppm: SAF-PD, PP ‡: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFS+SCBAE	Inh Ing Con	Irrit eyes, nose, throat; pulm edema; burns eyes, skin	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes, skin
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 30 mg/m ³ : DM* 60 mg/m ³ : DMXSQ*/SA*/SCBA* 150 mg/m ³ : SA, CF*/PAPRDM* 300 mg/m ³ : SCBAF/SAF/HIEF 10,000 mg/m ³ : SAF-PD, PP ‡: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Conj; nasal ulcer bleeding, upper resp irrit; bron, bronchial asthma; derm	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Resp sys, eyes, skin, liver, kidneys
Clothing: Reason prob Goggles: Reason prob Wash: Prompt contam/daily Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 0.5 mg/m ³ : DM 1 mg/m ³ : DMXSQ/SA/SCBA 2.5 mg/m ³ : PAPRDM/SA, CF 5 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE/ SAT, CF 100 mg/m ³ : SAF-PD, PP ‡: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Con	Irrit eyes; sens derm; yellow-stain hair, skin; weak, myalgia, anuria, polyuria; bitter taste, GI dist; hepatitis, hematuria, album, neph	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Kidneys, liver, blood, skin, eyes
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: After work if reason prob contam Remove: N.R.	NIOSH/OSHA 0.5 mg/m ³ : DM 1 mg/m ³ : DMXSQ/SA/SCBA 2.5 mg/m ³ : PAPRDM/SA, CF 5 mg/m ³ : PAPRTHIE/SCBAF/SAF/HIEF/ SAT, CF 200 mg/m ³ : SAF-PD, PP ‡: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBAE	Inh	Epis, excess bleeding from minor cuts, bruises; smoky urine, black tarry stools; pain abdom, back	Eye: Irr immed Swallow: Medical attention immed	Blood prothrombin

Pindone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Platinum (soluble salts as Pt)	Synonyms vary depending upon the specific soluble salt.	NIOSH/OSHA 0.002 mg/m ³	N.E.	Appearance and odor vary depending upon the specific soluble salt.	Properties vary depending upon the specific soluble salt.		None reported	Filter; Acid/Reagent; HGA; II(7) [§S191]
Portland cement 65997-15-1 VV8770000	Cement, Hydraulic cement, Portland cement silicate	NIOSH/OSHA 10 mg/m ³ (total) 5 mg/m ³ (resp)	N.E.	Gray, odorless powder.	MW: ? BP: NA Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: NA UEL: NA LEL: NA	None reported	Filter; none; Grav; III [§0500, Nuisance Dust (total)]
Noncombustible Solid								
Propane CH ₃ CH ₂ CH ₃ 74-98-6 TX2275000 1978 22	Bottled gas, Dimethyl methane, n-Propane, Propyl hydride	NIOSH/OSHA 1000 ppm (1800 mg/m ³)	20,000 ppm [LEL]	Colorless, odorless gas. [Note: A foul-smelling odorant is often added when used for fuel purposes. Shipped as a liquefied compressed gas.]	MW: 44.1 BP: -44°F Sol: 0.01% F.L.P.: NA (Gas) IP: 11.07 eV	VP: >1 atm FRZ: -306°F UEL: 9.5% LEL: 2.1%	Strong oxidizers	Combustible gas meter; none; none; II(2) [§587]
					Flammable Gas			
beta-Propiolactone C ₃ H ₄ O ₂ 57-57-8 RQ7350000	BPL; Hydroacrylic acid, beta lactone; 3-Hydroxy-beta-lactone; 3-Hydroxy-propionic acid; beta-Lactone; 2-Cretanone; 3-Propiolactone	NIOSH Ca See Appendix A OSHA [1910.1013] See Appendix B ACGIH 0.5 ppm, A2 (1.5 mg/m ³)	Ca	Colorless liquid with a slightly sweet odor.	MW: 72.1 BP: 323°F (Decomposes) Sol: 37% F.L.P.: 165°F IP: ? Sp.Gr: 1.15 Class IIIA Combustible Liquid	VP(77°F): 3 mm FRZ: -28°F UEL: ? LEL: 2.9%	Acetates, halogens, thiocyanates, thiosulfates [Note: May polymerize upon storage.]	None available

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Reason prob	NIOSH/OSHA	Inh	Irrit eyes, nose; cough,	Eye:	Irr immed	Resp sys, skin,
Goggles:	Reason prob	0.05 mg/m ³ : SA-CF†	Ing	dysp, wheez, cyan; skin	Skin:	Water flush immed	eyes
Wash:	Prompt contam	0.1 mg/m ³ : HIEF/SCBAF/SAF	Con	sens; lymphocytosis	Breath:	Resp support	
Change:	After work if reason pr. > contam	4 mg/m ³ : SAF-PD, PP			Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam	‡: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBAE					
Clothing:	Repeat	NIOSH/OSHA	Inh	Irrit eyes, nose; cough,	Eye:	Irr immed	Resp sys, eyes,
Goggles:	Reason prob	50 mg/m ³ : D	Con	expectoration; exertional	Skin:	Soap wash prompt	skin
Wash:	Prompt contam	100 mg/m ³ : SA/SCBA/DXSQ	Ing	dysp, wheez, chronic bron;	Breath:	Fresh air	
Change:	N.R.	250 mg/m ³ : PAPRD/SA, CF		derm	Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam	500 mg/m ³ : SCBAF/SAF/HIEF/SAT, CF/ PAPR/HIE 5000 mg/m ³ : SA, PD, PP ‡: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBAE					
Clothing:	Prevent skin freezing	NIOSH/OSHA	Inh	Dizz, disorientation,	Eye:	Irr immed	CNS
Goggles:	Reason prob	10,000 ppm: SA/SCBA	Con	excitation, frostbite	Skin:	Water flush immed	
Wash:	N.R.	20,000 ppm: SA, CF/SCBAF/SAF			Breath:	Resp support	
Change:	N.R.	‡: SCBAF-PD, PP/SAF-PD, PP-ASCBA					
Remove:	Immed wet (flamm)	Escape: SCBAE					
Clothing:	Any poss	NIOSH	Inh	Skin irrit, blistering,	Eye:	Irr immed	Kidney, skin,
Goggles:	Any poss	‡: SCBAF-PD, PP/SAF-PD, PP-ASCBA	Abs	burns; corneal opac;	Skin:	Soap wash immed	lungs, eyes
Wash:	Immed contam/daily	Escape: GMFOV/SCBAE	Ing	frequent urination;	Breath:	Resp support	
Change:	After work if any poss contam		Con	dysuria; hema; [carc]	Swallow:	Medical attention immed	
Remove:	Immed contam						
Provide:	Eyewash, quick drench						

beta-Propiolactone

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
n-Propyl acetate <chem>CH3COOCH2CH2CH3</chem> 109-60-4 A3675000	Propylacetate, n-Propyl ester of acetic acid	NIOSH/OSHA 200 ppm (840 mg/m ³) ST 250 ppm (1050 mg/m ³)	8000 ppm	Colorless liquid with a mild, fruity odor.	MW: 102.2 BP: 215°F Sol: 2% FLP: 55°F IP: 10.04 eV	VP(84°F): 40 mm FRZ: -134°F UEL: 8% LEL(100°F): 1.7%	Nitrates; strong oxidizers, alkalis & acids	Char; CS; GC/FID; III [#1450, Esters I]
1276 26	1 ppm = 4.25 mg/m ³				Sp.Gr: 0.84 Class IB Flammable Liquid			
n-Propyl alcohol <chem>CH3CH2CH2OH</chem> 71-23-8 UH8225000	Ethyl carbinol, 1-Propanol, n-Propanol, Propyl alcohol	NIOSH 200 ppm (500 mg/m ³) ST 250 ppm (625 mg/m ³) [skin] OSHA 200 ppm (500 mg/m ³) ST 250 ppm (625 mg/m ³)	4000 ppm	Colorless liquid with a mild, alcohol-like odor.	MW: 60.1 BP: 207°F Sol: Miscible FLP: 72°F IP: 10.15 eV	VP(77°F): 21 mm FRZ: -198°F UEL: 13.7% LEL: 2.2%	Strong oxidizers	Char; 2-Propanol/ CS; GC/FID; III [#1401, Alcohols II]
1274 26	1 ppm = 2.50 mg/m ³				Sp.Gr: 0.81 Class IB Flammable Liquid			
Propylene dichloride <chem>CH3CHClCH2Cl</chem> 78-87-5 TX9625000	Dichloro-1,2-propane; 1,2-Dichloropropane	NIOSH Ca See Appendix A OSHA 75 ppm (350 mg/m ³) ST 110 ppm (510 mg/m ³)	Ca [2000 ppm]	Colorless liquid with a chloroform-like odor. [pesticide]	MW: 113.0 BP: 206°F Sol: 0.3% FLP: 60°F IP: 10.87 eV	VP: 40 mm FRZ: -149°F UEL: 14.5% LEL: 3.4%	Strong oxidizers, strong acids	Char(pet); Acetone/ Cyclo- hexane; GC/ECG; III [#1013, 1,2-Di-chloro-propane]
1279 27	1 ppm = 4.70 mg/m ³				Sp.Gr: 1.16 Class IB Flammable Liquid			
Propylene imine <chem>C3H5N</chem> 75-55-8 CM8050000	2-Methylaziridine, 2-Methyl ethyleneimine, Propyleneimine, Propylene imine (inhibited) Propyleneimine	NIOSH Ca See Appendix A 2 ppm (5 mg/m ³) [skin] OSHA 2 ppm (5 mg/m ³) [skin]	Ca [500 ppm]	Colorless, oily liquid with an ammonia-like odor.	MW: 57.1 BP: 152°F Sol: Miscible FLP: 25°F IP: 9.00 eV	VP: 112 mm FRZ: -85°F UEL: ? LEL: ?	Acids, strong oxidizers, water, carbonyl compounds, quinones, sulfonyl halides [Note: Subject to violent polymerization in contact with acids. Hydrolyzes in water to form methyl ethanolamine.]	None available
1921 30 (inhibited)	1 ppm = 2.37 mg/m ³		ACGIH A2		Sp.Gr: 0.80 Class IB Flammable Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV ¹ /CCRFOV 5000 ppm: SA/CF ¹ 8000 ppm: GMFOV/SCBAF/SAF §: SCBAF-PD PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Con Ing	Irrit eyes, nose, throat; narco; derm	Eye: Skin: Breath:	Irr immed Water flush prompt Resp support	Resp sys, eyes, skin, CNS
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV ¹ /CCROV ¹ 2000 ppm: SA ¹ /SCBA ¹ 4000 ppm: SA/CF ¹ /SCBAF/SAF/GMFOV §: SCBAF-PD PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Mild irrit eyes, nose, throat; dry cracking skin; drow, head; ataxia, GI pain; abdom cramps: nau, vomit, diarr	Eye: Skin: Breath: Swallow:	Irr immed Water flush Resp support Medical attention immed	Skin, eyes, resp sys, GI tract
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Con Ing	Eye irrit; drow, li-head; irrit skin; [carc]; in animals: liver, kidney disease; skin irrit	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, eyes, resp sys, liver, kidneys
Clothing: Reason prob Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench		NIOSH §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Abs Ing Con	Eye, skin burns; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush Immed Resp support Medical attention immed	Eyes, skin

Propylene imine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr., flammability	VP, FRZ, UEL, LEL		
Propylene oxide C ₃ H ₆ O 75-56-9 TZ2975000	1,2-Epoxy propane; Methyl ethylene oxide; Methyloxirane; Propene oxide; 1,2-Propylene oxide	NIOSH Ca See Appendix A OSHA 20 ppm (50 mg/m ³)	Ca [2000 ppm]	Colorless liquid with a benzene-like odor. [Note: A gas above 94°F.]	MW: 58.1 BP: 94°F Sol: 41% FLP: -35°F IP: 9.81 eV Sp.Gr: 0.83 Class IA Flammable Liquid	VP: 445 mm FRZ: -170°F UEL: 36% LEL: 2.3%	Anhydrous metal chlorides; iron; strong acids, caustics & peroxides [Note: Polymerization may occur due to high temperatures or contamination with alkalis, aqueous acids, amines & acidic alcohols.]	Char; CS ₂ ; GC/FID; III [#1612]
1280 26 (inhibited)	1 ppm = 2.42 mg/m ³							
n-Propyl nitrate CH ₃ CH ₂ CH ₂ NO ₃ 627-13-4 UK0350000	Propyl ester of nitric acid	NIOSH/OSHA 25 ppm (105 mg/m ³) ST 40 ppm (170 mg/m ³)	2000 ppm	Colorless to straw-colored liquid with an ether-like odor.	MW: 105.1 BP: 231°F Sol: insoluble FLP: 68°F IP: 11.07 eV Sp.Gr: 1.07 Class IB Flammable Liquid	VP: 18 mm FRZ: -148°F UEL: 100% LEL: 2%	Strong oxidizers, combustible materials	Char; CS ₂ ; GC/FID; II(3) [#5227]
1865 30	1 ppm = 4.37 mg/m ³							
Pyrethrum C ₂₀ H ₂₈ O ₅ C ₂₁ H ₃₀ O ₅ C ₂₂ H ₃₂ O ₅ 8003-34-7 UR4200000 9184 31	Cinerin I or II, Jasmolin I or II, Pyrethrin I or II, Pyrethrum I or II	NIOSH/OSHA 5 mg/m ³	5000 mg/m ³	Brown, viscous oil or solid. [insecticide preparations containing pyrethrins]	MW: 316-372 BP: ? Sol: Insoluble FLP: 180 to 190°F IP: ? Class IIIA Combustible Liquid	VP: Low MLT: ? UEL: ? LEL: ?	Strong oxidizers	Filter; CH ₂ CN; HPLC/UV/D; III [#5008]
Pyridine C ₅ H ₅ N 110-86-1 UR8400000	Azabenzene, Azine	NIOSH/OSHA 5 ppm (15 mg/m ³)	3600 ppm	Colorless to yellow liquid with a nauseating, fish-like odor.	MW: 79.1 BP: 240°F Sol: Miscible FLP: 68°F IP: 9.27 eV Sp.Gr: 0.98 Class IB Flammable Liquid	VP(77°F): 20 mm FRZ: -44°F UEL: 12.4% LEL: 1.8%	Strong oxidizers, strong acids	Char; CH ₂ Cl ₂ ; GC/FID; III [#1613]
1282 26	1 ppm = 3.29 mg/m ³							

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Reason prob Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Quick drench	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Con Ing	Irrit eyes, upper resp sys, lungs; skin irrit, blister, burns; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed non-imperv contam	NIOSH/OSHA 250 ppm: SA/SCBA 625 ppm: SA,CF 1250 ppm: SCBAF/SAF/SAT,CF 2000 ppm: SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Con	In animals: methemoglobin, anoxia, cyan; dysp, weak, dizz, head; irrit eyes, skin	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	None known
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 50 mg/m ³ : CCRVDMFu*/SA*/SCBA* 125 mg/m ³ : SA,CF*/PAPROVDMFu* 250 mg/m ³ : CCRFOVH/E/SCBAF/SAF/PAPROVH/E* 5000 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVH/E/SCBAE	Inh Ing Con	Erythema, derm, papules, pruritus, rhin; sneezing; asthma	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, skin, CNS
Clothing: Reason prob Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: Eyewash, quick drench	NIOSH/OSHA 125 ppm: SA,CF*/PAPROV* 250 ppm: CCRFOV/GMFOV/SCBAF/SAF 3600 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Head, ner, dizz, insomnia; nau, anor; urine frequent; eye irrit; derm; liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	CNS, liver, kidneys, skin, GI tract

Pyridine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Quinone $C_6H_4O_2$ 106-51-4 DK2625000	1,4-Benzoquinone; p-Benzoquinone; 1,4-Cyclohexadiene dioxide; p-Quinone	NIOSH/OSHA 0.4 mg/m ³ (0.1 ppm)	300 mg/m ³	Pale-yellow solid with an acrid, chlorine-like odor.	MW: 108.1 BP: Sublimes Sol: Slight FLP: 100 to 200°F IP: 9.68 eV	VP(77°F): 0.1 mm MLT: 240°F UEL: ? LEL: ?	Strong oxidizers	XAD-2; Ethanol/ Hexane; HPLC/UV/D; II(4) [#S181]
2587 55					Sp.Gr: 1.92 Combustible Solid			
Rhodium (metal fume and insoluble compounds as Rh) Rh 7440-16-6 (Metal) VI9355000 (Metal)	Metal: Elemental rhodium Synonyms of other insoluble compounds vary depending upon the specific compound.	NIOSH/OSHA 0.1 mg/m ³	N.E.	Metal: White, hard, ductile, malleable solid with a bluish-gray luster.	MW: 102.9 BP: 6741°F Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 3571°F UEL: NA LEL: NA	None reported	Filter; Acid; AA; II(3) [#S188]
					Sp.Gr: 12.41 (Metal) Metal: Noncombustible Solid, but flammable in form of dust or powder.			
Rhodium (soluble compounds as Rh)	Synonyms vary depending upon the specific soluble compound.	NIOSH/OSHA 0.001 mg/m ³	N.E.	Appearance and odor vary depending upon the specific soluble compound.	Properties vary depending upon the specific soluble compound.		None reported	Filter; Acid; HGA; II(3) [#S189]
Ronnel $(CH_3O)_2P(S)OC_2H_5C_2H_5$ 299-84-3 TG0525000	O,O-Dimethyl O-(2,4,5-trichlorophenyl) phosphorothioate; Fenchlorophos	NIOSH/OSHA 10 mg/m ³	5000 mg/m ³	White to light tan, crystalline solid. [insecticide] [Note: A liquid above 95°F.]	MW: 321.6 BP: Decomposes Sol(77°F): 0.0004% FLP: NA IP: ?	VP(77°F): 0.0008 mm MLT: 106°F UEL: NA LEL: NA	Strong oxidizers	Filter/ Chrom-102; Toluene; GC/FID; II(6) [#S299]
					Sp.Gr(77°F): 1.49 Noncombustible Solid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Reason prob	NIOSH/OSHA	Inh	Eye irrit, conj; kera;	Eye:	Irr immed	Eyes, skin
Goggles:	Any poss	10 mg/m ³ : SA/CF ^a	Ing	skin irrit	Skin:	Soap wash immed	
Wash:	Immed contam	20 mg/m ³ : SCBAF/SAF	Con		Breath:	Resp support	
Change:	After work if any poss contam	300 mg/m ³ : SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP:ASCBA			Swallow:	Medical attention immed	
Remove:	Immed non-imperv contam	Escape: GMFOVHIE/SCBAE					
Provide:	Eyewash, quick drench						
Clothing:	N.R.	NIOSH/OSHA	Inh	None known	Breath:	Resp support	None known
Goggles:	N.R.	0.5 mg/m ³ : DM ^a			Swallow:	Medical attention immed	
Wash:	N.R.	1 mg/m ³ : SA/SCBA/DMXSO ^a					
Change:	N.R.	2.5 mg/m ³ : PAPRDMFu/SA/CF					
Remove:	N.R.	5 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE/ SAT/CF					
		100 mg/m ³ : SA-PD, PP					
		200 mg/m ³ : SAF-PD, PP					
		§: SCBAF-PD, PP/SAF-PD, PP:ASCBA					
		Escape: HIEF/SCBAE					
Clothing:	Repeat	NIOSH/OSHA	Inh	In animals: mild eye	Eye:	Irr immed	Eyes
Goggles:	Reason prob	0.01 mg/m ³ : HIE ^a /SA ^a /SCBA ^a	Ing	irrit; CNS damage	Skin:	Water flush	
Wash:	Prompt contam	0.025 mg/m ³ : PAPRTHIE ^a /SA/CF ^a	Con		Breath:	Art Resp	
Change:	N.R.	0.05 mg/m ³ : PAPRTHIE ^a /HIEF/SCBAF/ SAF			Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam	2 mg/m ³ : SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP:ASCBA					
		Escape: HIEF/SCBAE					
Clothing:	Repeat	NIOSH/OSHA	Inh	In animals: Chol	Eye:	Irr immed	Skin, liver,
Goggles:	Reason prob	100 mg/m ³ : CCROVDMFu/SA/SCBA	Ing	inhibition; eye irrit;	Skin:	Soap wash prompt	kidneys, blood
Wash:	Promptly contam	250 mg/m ³ : SA/CF/PAPROVDMFu	Con	liver, kidney damage	Breath:	Resp support	plasma
Change:	After work if reason prob contam	500 mg/m ³ : SCBAF/SAF/CCRFOVHIE/ GMFOVHIE/PAPRTOVHIE ^a			Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam	5000 mg/m ³ : SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP:ASCBA					
		Escape: GMFOVHIE/SCBAE					

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Rotenone C ₂₃ H ₁₂ O ₆ 83-79-4 DJ2600000	1,2,12,12a-Tetrahydro-8,9-dimethoxy-2-(1-methyl-ethenyl)-(1)benzopyrano [3,4-b]furo[2,3-h][1] benzopyran-6(6aH)-one	NIOSH/OSHA 5 mg/m ³	Unknown	Colorless to red, odorless, crystalline solid. [insecticide]	MW: 394.4 BP: Decomposes Sol: insoluble Fl.P: ? IP: ?	VP: Low MLT: 330°F UEL: ? LEL: ?	Strong oxidizers, alkalis	Filter: CH,CN; HPLC/UVD; III [#5007]
Selenium compounds (as Se) Se 7782-49-2 (element) VS7700000 (element) 2658 53 (powder) 2657 53 (disulfide)	Element: Elemental selenium, Selenium alloy Synonyms of other compounds vary depending upon the specific compound.	NIOSH/OSHA 0.2 mg/m ³	Unknown	Element: Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.]	MW: 79.0 BP: 1265°F Sol: Insoluble Fl.P: ? IP: NA	VP: 0 mm (approx) MLT: 392°F UEL: ? LEL: ?	Acids, strong oxidizers, chromium trioxide, potassium bromate	Filter: Acid; AA; III(7) [#5190]
Selenium hexafluoride (as Se) SeF ₆ 7783-79-1 VS9450000	Selenium fluoride	NIOSH/OSHA 0.05 ppm (0.4 mg/m ³)	5 ppm	Colorless gas.	MW: 193.0 BP: -30°F Sol: Insoluble Fl.P: NA IP: ?	VP: >1 atm FRZ: -59°F UEL: NA LEL: NA	Water [Note: Hydrolyzes very slowly in cold water.]	None available
2194 15	1 ppm = 8.02 mg/m ³				Nonflammable Gas			
Silica, amorphous SiO ₂ 7631-86-9 VV7310000	Diatomaceous earth, Diatomaceous silica, Diatomite, Silica gel, Silicon dioxide (amorphous)	NIOSH See Appendix D OSHA 5 mg/m ³ See Appendix C	N.E.	Transparent to gray, odorless powder. [Note: Amorphous silica is the non-crystalline form of SiO ₂ .]	MW: 60.1 BP: 4046°F Sol: Insoluble Fl.P: NA IP: NA	VP: 0 mm (approx) MLT: 3110°F UEL: NA LEL: NA	Fluorine, oxygen difluoride, chlorine trifluoride	Filter: LTA; XRD; III [#7501]
					Sp.Gr: 2.20 Noncombustible Solid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing:	Repeat	NIOSH/OSHA 5 mg/m ³ : CROVDMFu/SA/SCBA 125 mg/m ³ : SA/CF/PAPROVDMFu 250 mg/m ³ : SCBAF/SAF/CCRFVHIE/ GMFOVHIE/SAT/CF/ PAPRTOVHIE 5000 mg/m ³ : SA-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	Inh	Irrit eyes; numb muc memb; nau, vomit, abdom pain; musc tremor, inco, clonic convuls, stupor; pulm irrit; skin irrit	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	CNS, eyes, resp sys
Goggles:	Reason prob					
Wash:	Prompt contam					
Change:	After work if any poss contam					
Remove:	Prompt non-imperv contam					
Recommendations vary depending upon the specific compound.		NIOSH/OSHA 2 mg/m ³ : DMF*/SA*/SCBA* 5 mg/m ³ : PAPRDM**/SA/CF* 10 mg/m ³ : HIEF/SCBAF/SAF 100 mg/m ³ : SAF-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; vis dist; head; chills, fever; dysp, bron; metallic taste, garlic breath, GI dist; dermat; skin, eye burns; in animals: anemia; liver, kidney damage	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Upper resp sys, eyes, skin, liver, kidneys, blood
Clothing:	N.R.	NIOSH/OSHA 0.5 ppm: SA/SCBA 1.25 ppm: SA/CF 2.5 ppm: SCBAF/SAF/SAT/CF 5 ppm: SA-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Con	In animals: pulm irrit, edema	Breath: Resp support	None known in humans
Goggles:	N.R.					
Wash:	N.R.					
Change:	N.R.					
Remove:	N.R.					
Clothing:	N.R.	OSHA 30 mg/m ³ : DM 60 mg/m ³ : DMXSO/SA/SCBA 150 mg/m ³ : PAPRDM/SA/CF 300 mg/m ³ : HIEF/PAPRTHIE/SCBAF/ SAF/SAT/CF 3000 mg/m ³ : SA-PD,PP ‡: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh	Pneumoconiosis	Eye: Irr immed	Resp sys
Goggles:	N.R.					
Wash:	N.R.					
Change:	N.R.					
Remove:	N.R.					

Silica, amorphous

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Silica, crystalline (as respirable dust) SiO ₂ 14808-60-7 VV7330000	Cristobalite, Quartz, Tridymite, Tripoli	NIOSH Ca See Appendix A 0.05 mg/m ³ OSHA 0.05 mg/m ³ (cristobalite) 0.05 mg/m ³ (tridymite) 0.1 mg/m ³ (quartz) 0.1 mg/m ³ (tripoli)	Ca [N.E.]	Colorless, odorless solid. [Note: A component of many mineral dusts.]	MW: 60.1 BP: 4046°F Sol: Insoluble FLP: NA IP: NA Sp.Gr: 2.66 Noncombustible Solid	VP: 0 mm (approx) MLT: 3110°F UEL: NA LEL: NA	Powerful oxidizers: fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, hydrogen peroxide, etc.; acetylene; ammonia	Filter; LTA; XRD; III [#7500]
Silver (metal dust and soluble compounds as Ag) Ag 7440-22-4 (Metal) VW3500000 (Metal)	Metal: Silver metal Synonyms of soluble compounds vary depending upon the specific compound.	NIOSH/OSHA 0.01 mg/m ³	N.E.	Metal: White, lustrous solid.	MW: 107.9 BP: 3632°F Sol: Insoluble FLP: NA IP: NA Sp.Gr: 10.49 (Metal) Metal: Noncombustible Solid, but flammable in form of dust or powder.	VP: 0 mm (approx) MLT: 1761°F UEL: NA LEL: NA	Acetylene, ammonia, hydrogen peroxide, bromazide, chlorine trifluoride, ethyleneimine, oxalic acid, tartaric acid	Filter; Acid; ICP; III [#7300, Elements]
Soapstone (containing less than 1% quartz) 3MgO·4SiO ₂ ·H ₂ O VV8780000	Massive talc, Soapstone silicate, Steatite	NIOSH/OSHA 6 mg/m ³ (total) 3 mg/m ³ (resp)	N.E.	Odorless, white- gray powder.	MW: 379.3 BP: ? Sol: Insoluble FLP: NA IP: NA Sp.Gr: 2.7-2.8 Noncombustible Solid	VP: 0 mm (approx) MLT: ? UEL: NA LEL: NA	None reported	Filter; none; Grav; III [#0500, Nuisance Dust (total)]
Sodium fluoroacetate FCH ₂ C(O)ONa 62-74-8 AH9100000 2629 53	SFA, Sodium monofluoroacetate	NIOSH/OSHA 0.05 mg/m ³ ST 0.15 mg/im ³ [skin]	5 mg/m ³	Fluffy, colorless to white (sometimes dyed black), odorless powder. [Note: A liquid above 95°F.] [rodenticide]	MW: 100.0 BP: 332°F Sol: Miscible FLP: NA IP: ? Noncombustible Solid	VP: Low MLT: 95°F UEL: NA LEL: NA	None reported	Filter; Water; IC; II(5) [#S301]

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection -- maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	N.R.	NIOSH §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh	Cough, dysp, wheez; impaired pulm func, progressive symptoms; [carc]	Eye: Breath:	Irr immed Fresh air	Resp sys
Goggles:	N.R.						
Wash:	N.R.						
Change:	N.R.						
Remove:	N.R.						
Clothing:	Reason prob	NIOSH/OSHA 0.25 mg/m ³ : SA-CF ² /PAPRHE ¹ 0.5 mg/m ³ : HIEF/SCBAF/SAF 20 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Blue-gray eyes, nasal septum, throat, skin; irrit skin, ulceration; GI dist	Eye: Skin: Breath: Swallow:	Irr immed Water flush Resp support Medical attention immed	Nasal septum, skin, eyes
Goggles:	Any poss						
Wash:	Prompt contam						
Change:	After work if reason prob contam						
Remove:	Prompt non-imperv contam						
Provide:	Eyewash						
Clothing:	N.R.	NIOSH/OSHA 30 mg/m ³ : DM 60 mg/m ³ : DMXSO/SA/SCBA 150 mg/m ³ : PAPRDM/SA/SCBA 300 mg/m ³ : HIEF/SCBAF/SAF/ PAPRTHIE ¹ /SAT.CF [*] 3000 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Con	Cough, dysp; digital clubbing; cyan; basal crackles, cor pulmonale	Eye: Breath:	Irr immed Resp support	Lungs, CVS
Goggles:	N.R.						
Wash:	N.R.						
Change:	N.R.						
Remove:	N.R.						
Clothing:	Any poss	NIOSH/OSHA 0.25 mg/m ³ : DM 0.5 mg/m ³ : DMXSO/SA/SCBA 1.25 mg/m ³ : PAPRDM/SA/CF 2.5 mg/m ³ : PAPRTHIE/SCBAF/SAF HIEF/SAT.CF 5 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Vomit; appre, auditory hallu; facial pares; twitch face musc; pulsus alternans, ectopic heartbeat, tachard, venfib; pulm edema; nystagmus; convuls	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	CVS, lungs, kidneys, CNS
Goggles:	Reason prob						
Wash:	Immed contam						
Change:	After work if any poss contam						
Remove:	Immed non-imperv contam						
Provide:	Quick drench						

Sodium fluoroacetate

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: After work if reason prob contam Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 50 mg/m ³ : PAP/DM ² /SA,CF ⁴ 100 mg/m ³ : SCBAF/SAF/HIEF 250 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit nose; pneumis; burns eyes, skin; temporary loss of hair	Eye: Irr immed Skin: Water flush immed Breath: Resp support Swallow: Medical attention immed	Eyes, resp sys, skin	
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 1 ppm: SA/SCBA 2.5 ppm: SA,CF 5 ppm: SCBAF/SAF/SAT,CF 40 ppm: SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh	Head, weak; nau, abdom pain; lumbar pain, hemog, hema, hemolytic anemia; jaun; irrit lung	Breath: Resp support	Blood, liver kidneys, lungs	
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	NIOSH 3500 mg/m ³ : SA*/SCBA*/CCROV* 5900 mg/m ³ : PAP/ROV*/CCRFOV 8750 mg/m ³ : SA-CF* 17,500 mg/m ³ : GMFOV/SCBAF/SAF 29,500 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Con Ing	Irrit eyes, nose, throat; dizz; derm	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Skin, eyes, resp sys, CNS	
Clothing: Repeat Goggles: N.R. Wash: Prompt contam Change: After work if any poss contam Remove: N.R.	NIOSH/OSHA 0.75 mg/m ³ : DM 1.5 mg/m ³ : DMX/SQ/SA/SCBA 3 mg/m ³ : PAP/DM/SA-CF/HIEF/ SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Stiff neck, facial musc; restless, appre, incr acuity of perception; incr reflex excitability; cyan; tetanic convuls with opisthotonos	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	CNS	

Strychnine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Styrene $C_6H_5CH=CH_2$ 100-42-5 WL3675000	Ethenyl benzene, Phenylethylene, Styrene monomer, Styrol, Vinyl benzene	NIOSH/OSHA 50 ppm (215 mg/m ³) ST 100 ppm (425 mg/m ³)	5000 ppm	Colorless to yellow, oily liquid with a sweet, floral odor.	MW: 104.2 BP: 293°F Sol: Slight FLP: 88°F IP: 8.40 eV	VP: 5 mm FRZ: -23°F UEL: 7.0% LEL: 1.1%	Oxidizers, catalysts for vinyl polymers, peroxides, strong acids, aluminum chloride [Note: May polymerize if contaminated or subjected to heat. Usually contains an inhibitor such as tert-butylcatechol.]	Char; CS ₂ ; GC/FID; III [#1501, Aromatic Hydrocarbons]
2055 27 (inhibited)	1 ppm = 4.33 mg/m ³				Sp.Gr: 0.91 Class IC Flammable Liquid			
Sulfur dioxide SO_2 7446-09-5 WS4550000	Sulfurous acid anhydride, Sulfurous oxide, Sulfur oxide	NIOSH/OSHA 2 ppm (5 mg/m ³) ST 5 ppm (10 mg/m ³)	100 ppm	Colorless gas with a characteristic, irritating, pungent odor. [Note: A liquid below 14°F. Shipped as a liquefied compressed gas.]	MW: 64.1 BP: 14°F Sol: 10% FLP: NA IP: 12.30 eV	VP: >1 atm FRZ: -104°F UEL: NA LEL: NA	Powdered and alkali metals such as sodium & potassium, water, ammonia, aluminum [Note: Reacts with water to form sulfuric acid.]	Filters(2); NaHCO ₃ ; Na ₂ CO ₃ ; IC; III [#6004]
1079 16	1 ppm = 2.66 mg/m ³				Nonflammable Gas			
Sulfuric acid H_2SO_4 7664-93-9 WS5600000 1830 39 (51-95% acid) 1831 39 (fuming) 1832 39 (spent)	Battery acid, Hydrogen sulfate, Oil of vitriol, Sulfuric acid (aqueous)	NIOSH/OSHA 1 mg/m ³	80 mg/m ³	Colorless to dark-brown, oily, odorless liquid. [Note: Pure compound is a solid below 51°F. Often used in an aqueous solution.]	MW: 98.1 BP: 554°F Sol: Miscible FLP: NA IP: ? Sp.Gr: 1.84 (96-98% acid) Noncombustible Liquid, but capable of igniting finely divided combustible materials.	VP(295°F): 1 mm FRZ: 51°F UEL: NA LEL: NA	Organic materials, chlorates, carbides, fulminates, water, powdered metals [Note: Reacts violently with water with evolution of heat. Corrosive to metals.]	Si gel; NaHCO ₃ ; Na ₂ CO ₃ ; IC; III [#7903, Inorganic Acids]
Sulfur monochloride S_2Cl_2 10025-67-9 WS4300000	Sulfur chloride, Sulfur subchloride, Thiosulfuric dichloride	NIOSH/OSHA C 1 ppm (6 mg/m ³)	10 ppm	Light amber to yellow-red, oily liquid with a pungent, nauseating, irritating odor.	MW: 135.0 BP: 280°F Sol: Decomposes FLP: 245°F IP: 9.40 eV Sp.Gr: 1.68 Class IIIB Combustible Liquid	VP: 7 mm FRZ: -107°F UEL: ? LEL: ?	Peroxides, oxides of phosphorus, organics, water [Note: Decomposes violently in water to form hydrochloric acid, sulfur dioxide, sulfur, sulfite, thiosulfate, and hydrogen sulfide. Corrosive to metals.]	None available
1828 39	1 ppm = 5.61 mg/m ³							

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 500 ppm: CCROV*/SA*/SCBA* 1000 ppm: CCRFOV/PAPROV* 1250 ppm: SA-CF* 2500 ppm: GMFOV/SCBAF/SAF 5000 ppm: SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose; drow, weak, unsteady gait; narco; defatting derm	Eye: Skin: Breath: Swallow:	Irr Immed Water flush Resp support Medical attention immed	CNS, resp sys, eyes, skin
Clothing: Prevent skin freezing Goggles: Any poss Wash: N.R. Change: N.R. Remove: Immed wet Provide: Eyewash		NIOSH/OSHA 20 ppm: CCRS*/SA*/SCBA* 50 ppm: PAPRS*/SA-CF* 100 ppm: CCRFS*/GMFS/PAPRTS*/SCBAF/SAF/SAT-CF* §: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFS/SCBAE	Inh Con	Irrit eyes, nose, throat, rhin; choking, cough; reflex bronchoconstriction; eye, skin burns	Eye: Skin: Breath:	Irr Immed Water flush Resp support	Resp sys, skin, eyes
Clothing: Any poss >1%/Repeat <1% Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: >1%; Eyewash, quick drench		NIOSH/OSHA 25 mg/m ³ : PAPRAGHIE*/SA-CF* 50 mg/m ³ : CCRFAGHIE/SCBAF/SAF/GMFAGHIE 80 mg/m ³ : SAF-PD, PP §: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFAGHIE/SCBAE	Inh Ing Con	Eye, nose, throat irrit; pulm edema, bron; emphy; conj; stomatitis; dental erosion; trachbronc; skin, eye burns; derm	Eye: Skin: Breath: Swallow:	Irr Immed Water flush Resp support Medical attention immed	Resp sys, eyes, skin, teeth
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench		NIOSH/OSHA 10 ppm: PAPRS*/CCRFS*/GMFS/SCBAF/SAF §: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFS/SCBAE	Inh Con Ing	Lac; cough; burn eyes, skin; pulm edema	Eye: Skin: Breath: Swallow:	Irr Immed Water flush Resp support Medical attention immed	Resp sys, skin, eyes

Sulfur monochloride

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Sulfur pentafluoride SF_5 5714-22-7 WS4480000	Disulfur decafluoride, Sulfur decafluoride	NIOSH/OSHA C 0.01 ppm (0.1 mg/m ³)	1 ppm	Colorless liquid or gas (above 84°F) with an odor like sulfur dioxide.	MW: 254.1 BP: 84°F Sol: Insoluble Fl.P: NA IP: ?	VP: 561 mm FRZ: -134°F UEL: NA LEL: NA	None reported	None available
	1 ppm = 10.56 mg/m ³				Sp.Gr(32°F): 2.08 Noncombustible Liquid			
Sulfuryl fluoride SO_2F_2 2699-79-8 WT5075000	Sulfur difluoride dioxide	NIOSH/OSHA 5 ppm (20 mg/m ³) ST 10 ppm (40 mg/m ³)	1000 ppm	Colorless, odorless gas. [Note: Shipped as a liquefied compressed gas.] [insecticide/fumigant]	MW: 102.1 BP: -68°F Sol(32°): 0.2% Fl.P: NA IP: 13.04 eV	VP: >1 atm FRZ: -212°F UEL: NA LEL: NA	None reported	None available
2191 15	1 ppm = 4.24 mg/m ³				Nonflammable Gas			
2,4,5-T $C_6H_2Cl_2OCH_2COOH$ 93-76-5 A,B400000	2,4,5-Trichlorophenoxyacetic acid	NIOSH/OSHA 10 mg/m ³	Unknown	Colorless to tan, odorless, crystalline solid. [herbicide]	MW: 255.5 BP: Decomposes Sol: 0.03% Fl.P: ? IP: ?	VP: Low MLT: 307°F UEL: ? LEL: ?	None reported	Filter: Methanol; HPLC/UVD; III [#5001]
2765 55					Sp.Gr: 1.80 Combustible Solid, but burns with difficulty.			
Talc (containing no asbestos and less than 1% quartz) $Mg_3H_2(SiO_3)_4$ 14807-96-6 WW2710000	Hydrous magnesium silicate, Steatite talc	NIOSH/OSHA 2 mg/m ³ (resp)	N.E.	Odorless, white powder.	MW: Varies BP: ? Sol: Insoluble Fl.P: NA IP: NA	VP: 0 mm (approx) MLT: 1652 to 1832°F UEL: NA LEL: NA	None reported	Filter: none; Grav: III [#0600, Nuisance Dust (resp)]
					Sp.Gr: 2.70-2.80 Noncombustible Solid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Any poss Goggles: Any poss Wash: N.R. Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH/OSHA 0.1 ppm: SA/SCBA 0.25 ppm: SA,CF 0.5 ppm: SCBAF/SAF/SAT:CF 1 ppm: SA,PD,PP §: SCBAF-PD,PP/SAF-PD,PP,ASCBA Escape: GMFAG/SCBAE	Inh Con	In animals: pulm edema, hemorr	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, CNS
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 50 ppm: SA*/SCBA* 125 ppm: SA,CF* 250 ppm: SCBAF/SAF 1000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP,ASCBA Escape: GMFS/SCBAE	Inh Con	Conj, rhin, phar; pares: in animals: narco, tremor, convuls; pulm edema; kidney inj	Eye: Breath:	Irr immed Resp support	Resp sys, CNS
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 50 mg/m ³ : DM 100 mg/m ³ : DMXSQ/SA/SCBA 250 mg/m ³ : SA,CF/PAPRDM 500 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE/SAT:CF 5000 mg/m ³ : SA,PD,PP §: SCBAF-PD,PP/SAF-PD,PP,ASCBA Escape: HIEF/SCBAE	Inh Inh Con	In animals: ataxia; skin irrit, acne-like rash	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Skin, liver, GI tract
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 10 mg/m ³ : DM 20 mg/m ³ : DMXSQ/SA/SCBA 50 mg/m ³ : PAPRDM/SA,CF 100 mg/m ³ : HIEF/PAPRTHIE/SAT:CF SCBAF/SAF 1000 mg/m ³ : SA,PD,PP §: SCBAF-PD,PP/SAF-PD,PP,ASCBA Escape: HIEF/SCBAE	Inh Con	Fibrotic pneumoconiosis	Eye:	Irr immed	Lungs, CVS

Talc (containing no asbestos and less than 1% quartz)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Tantalum (metal and oxide dust as Ta) Ta 7440-25-7 (Metal) WWS505000 (Metal)	Metal: Tantalum-181 Synonyms of other compounds vary depending upon the specific compound.	NIOSH 5 mg/m ³ ST 10 mg/m ³ OSHA 5 mg/m ³	N.E.	Metal: Steel-blue to gray solid or black powder.	MW: 180.9 BP: 9797°F Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 5425°F UEL: NA LEL: NA	Strong oxidizers, bromine trifluoride, fluorine	Filter: none; Grav: III [#500, Nuisance Dust (total)]
TEDP (C ₂ H ₅) ₂ P ₂ S ₂ O ₅ 3689-24-5 XN4375000 1704 55	Dithion, Sulfotopp, Tetraethyl dithionopyrophosphate, Tetraethyl dithiopyrophosphate 1 ppm = 13.40 mg/m ³	NIOSH/OSHA 0.2 mg/m ³ [skin]	35 mg/m ³	Pale-yellow liquid with a garlic-like odor. [Note: A pesticide that may be absorbed on a solid carrier or mixed in a more flammable liquid.]	MW: 322.3 BP: Decomposes Sol: 0.0007% FLP: ? IP: ?	VP: 0.0002 mm FRZ: ? UEL: ? LEL: ?	Strong oxidizers, iron [Note: Corrosive to iron.]	None available
Tellurium and compounds (as Te) Te 13494-80-9 (Metal) WY2625000 (Metal)	Metal: Aurum paradoxum, Metallum problematum Synonyms of other compounds vary depending upon the specific compound.	NIOSH/OSHA 0.1 mg/m ³	N.E.	Metal: Odorless, dark-gray to brown, amorphous powder or grayish-white, brittle solid.	MW: 127.6 BP: 1814°F Sol: Insoluble FLP: ? IP: NA	VP: 0 mm (approx) MLT: 842°F UEL: ? LEL: ?	Oxidizers, chlorine	Filter: Acid; AA; II(3) [#5204]
Tellurium hexafluoride (as Te) TeF ₆ 7783-80-4 WY2800000 2195 15	Tellurium fluoride 1 ppm = 10.04 mg/m ³	NIOSH/OSHA 0.02 ppm (0.2 mg/m ³)	1 ppm	Colorless gas with a repulsive odor.	MW: 241.6 BP: Sublimes Sol: Decomposes FLP: NA IP: ?	VP: >1 atm FRZ: -36°F (Sublimes) UEL: NA LEL: NA	Water [Note: Hydrolyzes slowly in water to telluric acid.]	Char: NaOH; AA; II(3) [#5187]
					Nonflammable Gas			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	N.R.	NIOSH/OSHA	Inh	In animals: pulm irrit	Breath:	Resp support	None known in humans
Goggles:	N.R.	25 mg/m ³ : DM ^a					
Wash:	N.R.	50 mg/m ³ : DMXSO*/DMFu/SA/SCBA					
Change:	N.R.	125 mg/m ³ : PAPRDM*/SA:CF					
Remove:	N.R.	250 mg/m ³ : HIEF/PAPRTHIE/SAT:CF SCBAF/SAF					
		2500 mg/m ³ : SA:PD,PP					
		‡: SCBAF:PD,PP/SAF:PD,PP-ASCBA					
		Escape: HIEF/SCBAE					
Clothing:	Any poss	NIOSH/OSHA	Inh	Eye pain, blurred vision,	Eye:	Irr immed	CNS, resp sys.
Goggles:	Any poss	2 mg/m ³ : SA/SCBA	Abs	fac, rhin; head; cyan; anor;	Skin:	Soap wash immed	CVS
Wash:	Immed contam	5 mg/m ³ : SA:CF	Ing	nau, vomit, diarr; local	Breath:	Resp support	
Change:	N.R.	10 mg/m ³ : SCBAF/SAF	Con	sweat, weak, twitch,	Swallow:	Medical attention immed	
Remove:	Immed non-imperv contam	35 mg/m ³ : SA:PD,PP		para, Cheyne-Stokes resp,			
Provide:	Eyewash, quick drench	‡: SCBAF:PD,PP/SAF:PD,PP-ASCBA		convuls, low BP, card			
		Escape: GMFOVHIE/SCBAE		irregularities; skin, eye irrit			
Recommendations vary depending upon the specific compound.		NIOSH/OSHA	Inh	Garlic odor on breath,	Eye:	Irr immed	Skin, CNS
		0.5 mg/m ³ : DM ^a	Abs	sweat; dry mouth, metal	Skin:	Soap wash prompt	
		1 mg/m ³ : SA/SCBA/DMXSO*/DMFu	Ing	taste; som; anor;	Breath:	Resp support	
		2.5 mg/m ³ : PAPRDM*/SA:CF	Con	nau, no sweat; derm	Swallow:	Medical attention immed	
		5 mg/m ³ : PAPRTHIE/SCBAF/SAF/SAT:CF/HIEF					
		50 mg/m ³ : SA:PD,PP					
		‡: SCBAF:PD,PP/SAF:PD,PP-ASCBA					
		Escape: HIEF/SCBAE					
Clothing:	N.R.	NIOSH/OSHA	Inh	Head; dysp; garlic odor on breath;	Breath:	Resp support	Resp sys
Goggles:	N.R.	0.2 ppm: SA/SCBA		in animals: pulm edema			
Wash:	N.R.	0.5 ppm: SA:CF					
Change:	N.R.	1 ppm: SCBAF/SAF/SAT:CF					
Remove:	N.R.	‡: SCBAF:PD,PP/SAF:PD,PP-ASCBA					
		Escape: GMFS/SCBAE					

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL F.L.P. IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
TEPP (C ₂ H ₅) ₂ P ₂ O ₇ 107-49-3 UX6825000	Ethyl pyrophosphate, Tetraethyl pyrophosphate	NIOSH/OSHA 0.05 mg/m ³ [skin]	10 mg/m ³	Colorless to amber liquid with a faint, fruity odor. [Note: A solid below 32°F.] [insecticide]	MW: 290.2 BP: Decomposes Sol: Miscible F.L.P.: NA IP: ?	VP(96°F): 0.0005 mm FRZ: 32°F UEL: NA LEL: NA	Strong oxidizers, alkalis, water [Note: Hydrolyzes quickly in water to form pyrophosphoric acid.]	Chrom-102 (2); Toluene; GC/FPD; III [#2504, Tetraethyl Pyrophosphate]
2783 55 (dry)	1 ppm = 12.06 mg/m ³				Sp.Gr: 1.19 Noncombustible Liquid			
Terphenyls C ₆ H ₄ C ₆ H ₄ C ₆ H ₅ 26140-60-3 WZ6450000	Diphenylbenzenes; Phenyl biphenyls; ortho-, meta-, or para-Terphenyl	NIOSH/OSHA C 5 mg/m ³ (0.5 ppm)	Unknown	Colorless or light-yellow solid. [Note: Consists of 3 different isomers.]	MW: 230.3 BP: 630-761°F Sol: Insoluble F.L.P.(oc): 325 to 405°F IP: 7.99 eV(o) 8.01 eV(m) 7.78 eV(p) Sp.Gr: 1.10-1.23 Combustible Solid	VP: ? MLT: 136 to 415°F UEL: ? LEL: ?	None reported	Filter; CS ₂ ; GC/FPD; III [#5021]
1,1,2,2-Tetrachloro-1,2-difluoroethane CCl ₂ FCCl ₂ F 76-12-0 K11420000	1,2-Difluoro-1,1,2,2-tetrachloroethane; Freon® 112; Halocarbon 112; Refrigerant 112	NIOSH/OSHA 500 ppm (4170 mg/m ³)	15,000 ppm	Colorless solid or liquid (above 77°F) with a slight, ether-like odor.	MW: 203.8 BP: 199°F Sol(77°F): 0.01% F.L.P.: NA IP: 11.30 eV	VP: 40 mm MLT: 77°F UEL: NA LEL: NA	Chemically-active metals such as potassium, beryllium, powdered aluminum, zinc, magnesium & sodium; acids	Char; CS ₂ ; GC/FPD; III [#1016]
1078 12 (refrigerant)	1 ppm = 6.47 mg/m ³				Sp.Gr: 1.65 Noncombustible Solid			
1,1,1,2-Tetrachloro-2,2-difluoroethane CCl ₃ CClF ₂ 76-11-9 K11425000	2,2-Difluoro-1,1,1,2-tetrachloroethane; Freon® 112a; Halocarbon 112a; Refrigerant 112a	NIOSH/OSHA 500 ppm (4170 mg/m ³)	15,000 ppm	Colorless solid with a slight, ether-like odor. [Note: A liquid above 105°F.]	MW: 203.8 BP: 197°F Sol: 0.01% F.L.P.: NA IP: ?	VP: ? MLT: 105°F UEL: NA LEL: NA	Chemically-active metals such as potassium, beryllium, powdered aluminum, zinc, magnesium & sodium; acids	Char; CS ₂ ; GC/FPD; III [#1016]
	1 ppm = 6.47 mg/m ³				Noncombustible Solid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Any poss	NIOSH/OSHA	Inh	Eye pain, blurred vision, lac, rhin, head, tight chest, cyan; anor, nau, vomit, diar; weak, twitch, para, Cheyne-Stokes resp, convuls; low BP, card irregularities; local sweating	Eye:	Irr immed	CNS, resp sys, CVS, GI tract
Goggles:	Any poss	0.5 mg/m ³ ; SA/SCBA	Abs		Skin:	Water flush immed	
Wash:	Immed contam	1.25 mg/m ³ ; SA/CF	Ing		Breath:	Resp support	
Change:	N.R.	2.5 mg/m ³ ; SCBAF/SAF/SAT:CF	Con		Swallow:	Medical attention immed	
Remove:	Immed non-imperv contam	10 mg/m ³ ; SA/PD,PP					
Provide:	Eyewash, quick drench	g; SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE					
Clothing:	Any poss molt/Repeat liq-sol	NIOSH/OSHA	Inh	Irrit eyes, skin; thermal skin burns; head; sore throat	Eye:	Irr immed	Skin, resp sys, eyes
Goggles:	Any poss molt/Reason prob liq-sol	25 mg/m ³ ; DMF	Ing		Skin:	Water flush immed	
Wash:	Prompt contam	50 mg/m ³ ; DMXSO ₂ /SA ² /SCBA	Con		Breath:	Resp support	
Change:	After work if reason prob contam	125 mg/m ³ ; PAPRDM ² /SA:CF ²			Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam	250 mg/m ³ ; SCBAF/SAF/HIEF					
Provide:	Eyewash, quick drench	500 mg/m ³ ; SAF-PD,PP g; SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE					
Clothing:	Repeat	NIOSH/OSHA	Inh	Irrit skin; conj; pulm edema	Eye:	Irr immed	Lungs, skin
Goggles:	Reason prob	5000 ppm; SA/SCBA	Ing		Skin:	Soap wash prompt	
Wash:	Prompt wet	12,500 ppm; SA/CF	Con		Breath:	Resp support	
Change:	N.R.	15,000 ppm; SCBAF/SAF			Swallow:	Medical attention immed	
Remove:	Prompt non-imperv wet	g; SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE					
Clothing:	Repeat	NIOSH/OSHA	Inh	CNS depres; pulm edema; skin, eye irrit; drow; dysp	Eye:	Irr immed	Resp sys, skin
Goggles:	Reason prob	5000 ppm; SA/SCBA	Ing		Skin:	Soap wash prompt	
Wash:	Prompt contam	12,500 ppm; SA/CF	Con		Breath:	Resp support	
Change:	N.R.	15,000 ppm; SCBAF/SAF			Swallow:	Medical attention immed	
Remove:	Prompt non-imperv contam	g; SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE					

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, Sol, Fl.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
1,1,2,2-Tetrachloroethane CHCl ₂ CHCl ₂ 79-34-5 K18575000	Acetylene tetrachloride, Symmetrical tetrachloroethane	NIOSH Ca See Appendix A 1 ppm (7 mg/m ³) (skin) OSHA 1 ppm (7 mg/m ³) (skin)	Ca [150 ppm]	Colorless to pale-yellow liquid with a pungent, chloroform-like odor.	MW: 167.9 BP: 296°F Sol: 0.3% Fl.P: NA IP: 11.10 eV	VP(86°F): 9 mm FRZ: -33°F UEL: NA LEL: NA	Chemically-active metals, strong caustics, fuming sulfuric acid [Note: Degrades slowly when exposed to air.]	Char(pel); CS ₂ ; GC/FID; III [#1019]
1702 55	1 ppm = 7.00 mg/m ³				Sp.Gr(77°F): 1.59 Noncombustible Liquid			
Tetrachloroethylene C ₂ Cl ₄ -CCl ₂ 127-18-4 KX3850000	Perchloroethylene, Perchloroethylene, Perk., Tetrachloroethylene	NIOSH Ca See Appendix A Minimize workplace exposure concentrations; limit number of workers exposed. OSHA 25 ppm (170 mg/m ³)	Ca [500 ppm]	Colorless liquid with a mild, chloroform-like odor.	MW: 165.8 BP: 250°F Sol(77°F): 0.02% Fl.P: NA IP: 9.32 eV	VP: 14 mm FRZ: -2°F UEL: NA LEL: NA	Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash	Char; CS ₂ ; GC/FID; III [#1003, Halogenated Hydrocarbons]
1897 74	1 ppm = 6.89 mg/m ³				Sp.Gr: 1.62 Noncombustible Liquid			
Tetrachloronaphthalene C ₁₀ H ₆ Cl ₄ 1335-88-2 OK3700000	Halowax®, Nibren wax, Seekay wax	NIOSH/OSHA 2 mg/m ³ (skin)	Unknown	Colorless to pale-yellow solid with an aromatic odor.	MW: 265.9 BP: 593-680°F Sol: insoluble Fl.P(oc): 410°F IP: ?	VP: <1 mm FRZ: 360°F UEL: ? LEL: ?	Strong oxidizers	Filter/Bub; none; GC/FID; II(2) [#S130]
					Sp.Gr: 1.59-1.65 Combustible Solid			
Tetraethyl lead (as Pb) Pb(C ₂ H ₅) ₄ 78-00-2 TP4550000	Lead tetraethyl, TEL	NIOSH/OSHA 0.075 mg/m ³ (skin)	40 mg/m ³	Colorless liquid (unless dyed red, orange, or blue) with a pleasant, sweet odor. [Note: Main usage is in anti-knock additives for gasoline.]	MW: 323.5 BP: 228°F (Decomposes) Sol: Insoluble Fl.P: 200°F IP: 11.10 eV	VP: 0.2 mm FRZ: -202°F UEL: ? LEL: 1.8%	Strong oxidizers, sulfuric chloride, rust, potassium permanganate [Note: Decomposes slowly at room temperature and more rapidly at higher temperatures.]	XAD-2; Pentane; GC/FID; III [#2533]
1649 56	1 ppm = 13.45 mg/m ³				Sp.Gr: 1.65 Class IIIB Combustible Liquid			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4).	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Any poss	NIOSH V; SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Nau, vomit, abdom pain; tremor fingers; jaun, enlarged lend liver; derm; monocy; kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Liver, kidneys, CNS
Goggles:	Any poss						
Wash:	Immed contam						
Change:	N.R.						
Remove:	Immed non-imperv contam						
Provide:	Eyewash, quick drench						
Clothing:	Repeat	NIOSH V; SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; nau; flush face, neck; vert; dizz, inco; head, som; skin eryt; liver damage; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Liver, kidneys, eyes, upper resp sys, CNS
Goggles:	Reason prob						
Wash:	Prompt contam						
Change:	N.R.						
Remove:	Prompt non-imperv contam						
Clothing:	Any poss molt/Repeat liq-sol	NIOSH/OSHA 20 mg/m ³ : SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/HIE/SCBAE	Inh Abs Ing Con	Acne-form derm; head, ftg, anor, vert; jaun, liver inj	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Liver, skin
Goggles:	Any poss molt/Reason prob liq-sol						
Wash:	Prompt contam						
Change:	After work if any poss contam						
Remove:	Immed non-imperv contam molt/ Prompt non-imperv contam sol						
Clothing:	Any poss >0.1%	NIOSH/OSHA 0.75 mg/m ³ : SA/SCBA 1.875 mg/m ³ : SA,CF 3.75 mg/m ³ : SCBAF/SAF/SAT:CF 40 mg/m ³ : SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Insom, lass, anxiety; tremor, hyper-reflexia, spastic; bradycardia, hypotension, hypothermia, pallor, nau, anor, low-wgt; disorientation, haliu, psychosis, mania, convuls, coma; eye irrit	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	CNS, CVS, kidneys, eyes
Goggles:	Reason prob						
Wash:	N.R.						
Change:	After work if any poss contam >0.1%						
Remove:	Immed non-imperv contam (>0.1%)						
Provide:	Quick drench (>0.1%)						

Tetraethyl lead (as Pb)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, Fl.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Tetrahydrofuran C_4H_8O 109-99-9 LUS950000	Diethylene oxide; 1,4-Epoxybutane; Tetramethylene oxide; THF	NIOSH/OSHA 200 ppm (590 mg/m ³) ST 250 ppm (735 mg/m ³)	20,000 ppm [LEL]	Colorless liquid with an ether-like odor.	MW: 72.1 BP: 151°F Sol: Miscible FLP: 6°F IP: 9.45 eV	VP: 132 mm FRZ: -163°F UEL: 11.8% LEL: 2%	Strong oxidizers, lithium-aluminum alloys [Note: Peroxides may accumulate upon prolonged storage in presence of air.]	Char; CS ₂ ; GC/FID; II III [#1609]
2056 26	1 ppm = 3.00 mg/m ³				Sp.Gr: 0.89 Class IB Flammable Liquid			
Tetramethyl lead (as Pb) $Pb(CH_3)_4$ 75-74-1 TP4725000	Lead tetramethyl, TML	NIOSH/OSHA 0.075 mg/m ³ [skin]	40 mg/m ³	Colorless liquid (unless dyed red, orange, or blue) with a fruity odor. [Note: Main usage is in anti-knock additives for gasoline.]	MW: 267.3 BP: 212°F (Decomposes) Sol: Insoluble FLP: 100°F IP: 6.50 eV	VP: 23 mm FRZ: -15°F UEL: ? LEL: ?	Strong oxidizers such as sulfuric chloride or potassium permanganate	XAD-2; Pentane; GC/PID; III [#2534]
1649 56	1 ppm = 11.11 mg/m ³				Sp.Gr: 2.00 Class II Combustible Liquid			
Tetramethyl succinonitrile (as Pb) $(CH_3)_2C(CN)C(CN)(CH_3)_2$ 3333-52-6 WN4025000	Tetramethyl succinodinitrile, TMSN	NIOSH/OSHA 3 mg/m ³ (0.5 ppm) [skin]	5 ppm	Colorless, odorless solid.	MW: 136.2 BP: Sublimes Sol: Insoluble FLP: ? IP: ?	VP: ? MLT: 338°F (Sublimes) UEL: ? LEL: ?	Strong oxidizers	Char; CS ₂ ; GC/FID; II(3) III [#S155]
					Sp.Gr: 1.07 Combustible Solid			
Tetranitromethane $C(NO_2)_4$ 509-14-8 PB4025000	Tetan, TNM	NIOSH/OSHA 1 ppm (6 mg/m ³)	5 ppm	Colorless to pale-yellow liquid or solid (below 57°F) with a pungent odor.	MW: 196.0 BP: 259°F Sol: Insoluble FLP: ? IP: ?	VP: 8 mm FRZ: 57°F UEL: ? LEL: ?	Hydrocarbons, alkalis, metals, oxidizers, aluminum, toluene, cotton [Note: May decompose explosively if contaminated with combustible material.]	Imp; non; GC/Air-FID; II(3) III [#S224]
1510 47	1 ppm = 6.15 mg/m ³				Sp.Gr: 1.62 Combustible Liquid, but difficult to ignite.			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)		NIOSH/OSHA 1000 ppm: PAPROV ⁵ /CCRFOV 5000 ppm: SA,CF ⁶ 10,000 ppm: GMFOV/SCBAF/SAF 20,000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Con Ing	Irrit eyes, upper resp sys; nau, dizz, head	Eye: Skin: Breath: Swallow: Irr immed Water flush prompt Resp support Medical attention immed	Eyes, skin, resp sys, CNS
Clothing: Any poss >1.06% Goggles: Reason prob Wash: N.R. Change: N.R. Remove: Immed non-imperv contam Provide: >1.06% Quick drench		NIOSH/OSHA 0.75 mg/m ³ : SA/SCBA 1.875 mg/m ³ : SA,CF 3.75 mg/m ³ : SCBAF/SAF/SAT:CF 40 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Insom, bad dreams, restless, anxious; hypotension; nau, anor; delirium, mania, convuls; coma	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	CNS, CVS, kidneys
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam		NIOSH/OSHA 30 mg/m ³ : SA/SCBA §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/HIE/SCBAE	Inh Abs Ing Con	Head, nau; convuls, coma	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	CNS
Clothing: Reason prob Goggles: Any poss Wash: Prompt contam Change: After work if reason prob contam Remove: Immed wet (flamm) Provide: Eyewash		NIOSH/OSHA 5 ppm: SA,CF ⁴ /PAPRS ⁴ /CCRFS ⁴ / GMFS ⁴ /SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS ⁴ /SCBAE	Inh Ing Con	Irrit eyes, nose, throat; dizz, head; chest pain, dysp; methemoglobinuria, cyan; skin burns	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, eyes, skin, blood, CNS

Tetranitromethane

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Tetryl (NO ₂) ₃ C ₇ H ₇ N(NO ₂)CH ₃ 479-45-8 BY6300000	N-Methyl-N,2,4,6-tetra-nitroaniline; Nitramine; 2,4,6-Tetryl; 2,4,6-Trinitrophenyl-N-methylnitramine	NIOSH/OSHA 1.5 mg/m ³ [skin]	N.E.	Colorless to yellow, odorless, crystalline solid.	MW: 287.2 BP: 356-374°F (Explodes) Sol: Insoluble F.L.P.: Explodes IP: ?	VP: Low MLT: 268°F UEL: ? LEL: ?	Oxidizable materials, hydrazine	Filter; Reagent; Vis: II(3) [#S225]
					Sp.Gr: 1.57 Combustible Solid			
Thallium (soluble compounds as TI) 7440-28-0 XG3425000	Synonyms vary depending upon the specific soluble compound.	NIOSH/OSHA 0.1 mg/m ³ [skin]	20 mg/m ³	Appearance and odor vary depending upon the specific soluble compound.	Properties vary depending upon the specific soluble compound.		None reported	Filter; Acid; AA; II(3) [#S306]
1707 53 (cmpds)								
Thiram (CH ₃) ₂ NC(S)SSC(S)(CH ₃) ₂ 137-26-8 JO1400000	bis(Dimethylthiocarbamoyl) disulfide, Tetramethylthiram disulfide	NIOSH/OSHA 5 mg/m ³	1500 mg/m ³	Colorless to yellow, crystalline solid. [Note: Commercial pesticide products may be dyed blue.]	MW: 240.4 BP: Decomposes Sol: Insoluble F.L.P.: ? IP: ?	VP: Low MLT: 312°F UEL: ? LEL: ?	Strong oxidizers, strong acids, oxidizable materials	Filter; CH ₃ CN; HPLC/UV/D; III [#S005]
2771 55					Sp.Gr: 1.29 Combustible Solid			
Tin (inorganic compounds except oxides, as Sn) Sn 7440-31-5 (Metal) XP7320000 (Metal)	Metal: Metallic tin, Tin flake, Tin powder Synonyms of other inorganic compounds vary depending upon the specific compound.	NIOSH/OSHA 2 mg/m ³	400 mg/m ³	Metal: Gray to almost silver-white, ductile, malleable, lustrous solid.	MW: 118.7 BP: 4545°F Sol: Insoluble F.L.P.: NA IP: NA	VP: 0 mm (approx) MLT: 449°F UEL: NA LEL: NA	Chlorine, turpentine, acids, alkalis	Filter; Acid; AA; I(3) [#S183]
					Sp.Gr: 7.28 (Metal) Metal: Noncombustible Solid, but powdered form may ignite.			

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Repeat	NIOSH/OSHA	Inh	Sens derm, itch, eryt,	Eye:	Irr immed	Resp sys, eyes,
Goggles:	Reason prob	7.5 mg/m ³ : DM	Abs	edema on nasal folds,	Skin:	Soap wash prompt	CNS, skin;
Wash:	Prompt contam/daily	15 mg/m ³ : DMXSO*/SA*/SCBA*	Ing	cheeks, neck; kara;	Breath:	Resp support	in animals:
Change:	After work if reason prob contam	37.5 mg/m ³ : PAPRDM*/SA/CF*	Con	sneezing; anemia; flg;	Swallow:	Medical attention immed	liver, kidneys
Remove:	Prompt non-imperv contam	75 mg/m ³ : HIEF/SCBAF/SAF 3000 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE		cough, coryza; irrity; mal, head, lass, insom; nau, vomit			
Clothing:	Reason prob	NIOSH/OSHA	Inh	Nau, diarr, abdom pain,	Eye:	Irr immed	Eyes, CNS, lungs;
Goggles:	Reason prob	0.5 mg/m ³ : DM*	Abs	vomit; ptosis, strabismus;	Skin:	Water flush prompt	liver, kidneys,
Wash:	Prompt contam	1 mg/m ³ : DMXSO*/SA/SCBA	Ing	peri neuritis, tremor;	Breath:	Resp support	GI tract, body
Change:	After work if reason prob contam	2.5 mg/m ³ : PAPRDM*/SA/CF	Con	retster tightness, chest pain, pulm edema; sez,	Swallow:	Medical attention immed	hair
Remove:	Prompt non-imperv contam	5 mg/m ³ : HIEF/SCBAF/SAF/PAPRTHIE/ SAT/CF 20 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE		chorea, psychosis; liver, kidney damage; alopecia; pares legs			
Clothing:	Reason prob	NIOSH/OSHA	Inh	Irrit muc memb; derm;	Eye:	Irr immed	Resp sys, skin
Goggles:	Reason prob	50 mg/m ³ : CPROVDMFu*/SA*/SCBA*	Ing	with ethanol	Skin:	Soap wash prompt	
Wash:	Prompt contam	125 mg/m ³ : PAPROVDMFu*/SA/CF*	Con	consumption: flush, eryt,	Swallow:	Medical attention immed	
Change:	After work if reason prob contam	250 mg/m ³ : SCBAF/SAF/CCRFOVHIE/ PAPRTOVHIE*/GMFOVHIE		pruritus, urticaria, head, nau, vomit, diarr, weak, dizz, dyp			
Remove:	Prompt non-imperv contam	1500 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVHIE/SCBAE					
Recommendations vary depending upon the specific compound.		NIOSH/OSHA	Inh	Irrit eyes, skin	Eye:	Irr immed	Eyes, skin, resp
		10 mg/m ³ : DM*	Con		Skin:	Soap wash immed	sys
		20 mg/m ³ : DMXSO**/SA*/SCBA*			Breath:	Resp support	
		50 mg/m ³ : PAPRDM**/SA/CF*			Swallow:	Medical attention immed	
		100 mg/m ³ : HIEF/SCBAF/SAF					
		400 mg/m ³ : SAF-PD,PP					
		§: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE					

Tin (inorganic compounds except oxides, as Sn)

Chemical name, structure/formula, CAS and RECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FL.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Tin (organic compounds as Sn)	Synonyms vary depending upon the specific organic compound.	NIOSH/OSHA 0.1 mg/m ³ [skin]	Unknown	Appearance and odor vary depending upon the specific organic compound.	Properties vary depending upon the specific organic compound.		Strong oxidizers	Filter/ XAD-2; HPLC; AA; II [#5504]
Titanium dioxide TiO ₂ 13463-67-7 XR2275000	Rutile, Titanium oxide, Titanium peroxide	NIOSH Ca See Appendix A OSHA 10 mg/m ³	Ca [N.E.]	White, odorless powder.	MW: 79.9 BP: 4532 to 5432°F Sol: Insoluble FL.P: NA IP: NA Sp.Gr: 4.26 Noncombustible Solid	VP: 0 mm (approx) MLT: 3326 to 3362°F UEL: NA LEL: NA	None reported	Filter; Acid; AA; II(3) [#5385]
Toluene C ₆ H ₅ CH ₃ 108-88-3 XS5250000	Methyl benzene, Methyl benzol, Phenyl methane, Toluol	NIOSH/OSHA 100 ppm (375 mg/m ³) ST 150 ppm (560 mg/m ³)	2000 ppm	Colorless liquid with a sweet, pungent, benzene-like odor.	MW: 92.1 BP: 232°F Sol(61°F): 0.65% FL.P: 40°F IP: 8.82 eV Sp.Gr: 0.87 Class IB Flammable Liquid	VP(65°F): 20 mm FRZ: -139°F UEL: 7.1% LEL: 1.2%	Strong oxidizers	Char; CS ₂ ; GC/FID; III [#1500, Hydrocarbons]
1294 27	1 ppm = 3.83 mg/m ³							
Toluene-2,4-disocyanate CH ₃ C ₆ H ₃ (NCO) ₂ 584-84-9 CZ6300000	TDI; 2,4-TDI; 2,4-Toluene diisocyanate	NIOSH Ca See Appendix A 0.005 ppm (0.04 mg/m ³) ST 0.02 ppm (0.15 mg/m ³) OSHA 0.005 ppm (0.04 mg/m ³) ST 0.02 ppm (0.15 mg/m ³)	Ca [10 ppm]	Colorless to pale-yellow solid or liquid (above 71°F) with a sharp, pungent odor.	MW: 174.2 BP: 484°F Sol: Insoluble FL.P: 260°F IP: 7 Sp.Gr: 1.22 Class IIIB Combustible Liquid	VP(77°F): 0.01 mm MLT: 71°F UEL: 9.5% LEL: 0.9%	Strong oxidizers, water, acids, bases & amines may cause foam and spatter; alcohols [Note: Reacts slowly with water to form carbon dioxide and polyureas.]	Coated glass wool; Methanol; HPLC/UV/D; III [#2535]
2078 57	1 ppm = 7.24 mg/m ³							

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Recommendations vary depending upon the specific compound.	NIOSH/OSHA 1 mg/m ³ : CCROVDM/SA/SCBA 2.5 mg/m ³ : SA/CF/PAPROVDM 5 mg/m ³ : CCRFOVHIE/SCBAF/SAF/ GMFOVHIE/PAPRTOVHIE/ SAT/CF 200 mg/m ³ : SAF/PD,PP §: SCBAF/PD,PP/SAF/PD,PP/ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Head, vert; irrit eyes; psycho-neurologic dist; sore throat, cough; abdom pain, vomit; urine retention; paresis, focal anes; skin burns; pruritus; in animals: hemolysis, hepatic nec	Eye: Skin: Breath: Swallow: Irr immed Water flush immed Resp support Medical attention immed	CNS, eyes, liver, urinary tract, skin, blood
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH §: SCBAF/PD/PP/SAF/PD,PP/ASCBA Escape: HIEF/SCBAE	Inh	Slight lung fib; [carc]	Breath: Resp support	Lungs
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: CCROV*/SA*/PAPROV*/ SCBA* 2000 ppm: SA/CF*/SCBAF/SAF/GMFOV §: SCBAF/PD,PP/SAF/PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Flg, weak; conf, euph, dizz, head; dilated pupils, lac; ner, musc flg, insom; pares; derm	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	CNS, liver, kidneys, skin
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: After work if reason prob contam Remove: Prompt non-imperv contam Provide: Eyewash, quick drinch	NIOSH §: SCBAF/PD,PP/SAF/PD,PP/ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit nose, throat; choke, paroxysmal cough; chest pain, retester soreness; nau, vomit, abdom pain; bron spasm, pulm edema; dysp, asthma; con; lac; derm, skin sens; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, skin

Toluene-2,4-diisocyanate

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL.P, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
o-Toluidine CH ₃ C ₆ H ₄ NH ₂ 95-53-4 XU2975000	o-Aminotoluene, 2-Aminotoluene, 1-Methyl-2-aminobenzene, o-Methylaniline, 2-Methylaniline, ortho-Toluidine	NIOSH Ca See Appendix A 2 ppm (9 mg/m ³) (skin) OSHA 5 ppm (22 mg/m ³) (skin)	Ca [100 ppm] ACGIH A2	Colorless to pale-yellow liquid with an aromatic, aniline-like odor.	MW: 107.2 BP: 392°F Sol: 2% FL.P: 185°F IP: 7.44 eV	VP: 0.3 mm FRZ: 6°F UEL: ? LEL: ?	Strong oxidizers, nitric acid	Si gel; Ethanol; GC/FID; III #2002, Aromatic Amines]
1708 55	1 ppm = 4.46 mg/m ³				Sp.Gr: 1.01 Class IIIA Combustible Liquid			
Tributyl phosphate (CH ₃) ₃ (CH ₂) ₃ O ₂ PO 126-73-8 TC7700000	Butyl phosphate, TBP, Tributyl ester of phosphoric acid, tri-n-Butyl phosphate	NIOSH/OSHA 0.2 ppm (2.5 mg/m ³)	125 ppm	Colorless to pale-yellow, odorless liquid.	MW: 266.3 BP: 552°F (Decomposes) Sol: 0.6% FL.P(oc): 295°F IP: ?	VP:(351°F): 127 mm FRZ: -112°F UEL: ? LEL: ?	None reported	Filter; Diethyl ether; GC/FPD; II(3) #S208]
	1 ppm = 11.07 mg/m ³				Sp.Gr: 0.98 Class IIIB Combustible Liquid			
1,1,2-Trichloroethane CHCl ₂ CH ₂ Cl 79-00-5 KJ3150000	beta-Trichloroethane, Vinyl trichloride	NIOSH Ca See Appendix A 10 ppm (45 mg/m ³) (skin) OSHA 10 ppm (45 mg/m ³) (skin)	Ca [500 ppm]	Colorless liquid with a sweet, chloroform-like odor.	MW: 133.4 BP: 237°F Sol: 0.4% FL.P: NA IP: 11.00 eV	VP: 19 mm FRZ: -34°F UEL: NA LEL: NA	Strong oxidizers & caustics; chemically-active metals such as aluminum, magnesium powders, sodium & potassium	Char; CS ₂ ; GC/FID; III #1003, Halogenated Hydrocarbons]
2831 74	1 ppm = 5.55 mg/m ³				Sp.Gr: 1.44 Noncombustible Liquid			
Trichloroethylene ClCH=CCl ₂ 79-01-6 KX4550000	Ethylene trichloride, Triclene, Trichloroethene	NIOSH Ca See Appendix A 25 ppm OSHA 50 ppm (270 mg/m ³) ST 200 ppm (1080 mg/m ³)	Ca [1000 ppm]	Colorless liquid (unless dyed blue) with a chloroform-like odor.	MW: 131.4 BP: 189°F Sol:(77°F): 0.1% FL.P: 90°F IP: 9.45 eV	VP: 58 mm FRZ: -99°F UEL:(77°F): 10.5% LEL:(77°F): 8%	Strong caustics & alkalis; chemically- active metals such as barium, lithium, sodium, magnesium, titanium & beryllium	Char; CS ₂ ; GC/FID; III #1022]
1710 74	1 ppm = 5.46 mg/m ³				Sp.Gr: 1.46 Class IC Flammable Liquid, but burns with difficulty.			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: Any poss Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Anoxia, head, cyan; weak, dizz, drow; micro hematuria, eye burns; derm; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Blood, kidneys, liver, CVS, skin, eyes
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	NIOSH/OSHA 2 ppm: SA/SCBA 5 ppm: SA/CF 10 ppm: SCBAF/SAF 125 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOVH/E/SCBAE	Inh Con Ing	Eyes, resp, skin irrit; head; nau	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin, eyes
Clothing: Repeat Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit nose, eyes; CNS depres; liver, kidney damage; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	CNS, eyes, nose, liver, kidneys
Clothing: Repeat Goggles: Reason prob Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	NIOSH V: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Head, verti; vis dist, tremors, som, neu, vomit; irrit eyes; derm; card arrhy, pares; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, heart, liver, kidneys, CNS, skin

Trichloroethylene

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FL.P, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Trichloronaphthalene $C_{10}H_7Cl_3$ 1321-65-9 QK4025000	Halowax®, Nibren wax, Seekay wax	NIOSH/OSHA 5 mg/m ³ [skin]	Unknown	Colorless to pale-yellow solid with an aromatic odor.	MW: 231.5 BP: 579-669°F Sol: insoluble FLP(oc): 392°F IP: ? Sp.Gr: 1.58 Combustible Solid	VP: <1 mm MLT: 199°F UEL: ? LEL: ?	Strong oxidizers	Filter/Bub; none; GC/FID; II(2) [#S128]
1,2,3-Trichloropropane $CH_2ClCHClCH_2Cl$ 96-18-4 TZ9275000	Allyl trichloride, Glycerol trichlorohydrin, Glyceryl trichlorohydrin, Trichlorohydrin	NIOSH Ca See Appendix A 10 ppm (60 mg/m ³) [skin] OSHA 10 ppm (60 mg/m ³)	Ca [1000 ppm]	Colorless liquid with a chloroform-like odor.	MW: 147.4 BP: 314°F Sol: 0.1% FLP(oc): 180°F IP: ? Sp.Gr: 1.39 Class IIIA Combustible Liquid	VP(115°F): 10 mm FRZ: 6°F UEL: ? LEL: ?	Chemically-active metals, strong caustics & oxidizers	Char; CS ₂ ; GC/FID; III [#1003, Halogenated Hydrocarbons]
1,1,2-Trichloro-1,2,2-trifluoroethane CCl_2FCClF_2 76-13-1 KJ4000000	Chlorofluorocarbon-113, CFC-113, Freon® 113, Genetron® 113, Halocarbon 113, Refrigerant 113, TTE	NIOSH/OSHA 1000 ppm (7600 mg/m ³) ST 1250 ppm (9500 mg/m ³)	4500 ppm	Colorless to water-white liquid with an odor like carbon tetrachloride at high concentrations. [Note: A gas above 118°F.]	MW: 187.4 BP: 118°F Sol(77°F): 0.02% FLP: ? IP: 11.99 eV Sp.Gr(77°F): 1.56 Noncombustible Liquid at ordinary temperatures, but the gas will ignite and burn weakly at 1256°F	VP: 285 mm FRZ: -31°F UEL: ? LEL: ?	Chemically-active metals such as calcium, powdered aluminum, zinc, magnesium & beryllium [Note: Decomposes if in contact with alloys containing >2% magnesium.]	Char; CS ₂ ; GC/FID; III [#1020]
Triethylamine $(C_2H_5)_3N$ 121-44-8 YEO175000 1296 68	TEA	NIOSH See Appendix D OSHA 10 ppm (40 mg/m ³) ST 15 ppm (60 mg/m ³)	1000 ppm	Colorless liquid with a strong, ammonia-like odor.	MW: 101.2 BP: 193°F Sol: 2% FLP(oc): 16°F IP: 7.50 eV Sp.Gr: 0.73 Class IB Flammable Liquid	VP: 54 mm FRZ: -175°F UEL: 8.0% LEL: 1.2%	Strong oxidizers, strong acids	Bub; NaOH; GC/FID; III(3) [#S152]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: Any poss molt-fume/ Repeat liq-sol Goggles: Any poss molt/Reason prob liq-sol Wash: Prompt contam Change: After work if reason prob contam sol Remove: Immed non-imperv contam molt/Prompt non-imperv contam sol	NIOSH/OSHA 50 mg/m ³ : SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA §: GMFOVH/E/SCBAE	Inh Abs Ing Con	Acne-form dermat; anor; nau; verti; jaun, liver inj	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, liver
Clothing: Repeat Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed non-imperv contam Provide: Eyewash, quick drench	NIOSH v: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, throat; CNS depres; liver inj; skin irrit; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, resp sys, skin, CNS, liver
Clothing: Repeat Goggles: Any poss Wash: Prompt wet Change: N.R. Remove: Prompt non-imperv wet	NIOSH/OSHA 4500 ppm: SA/SCBA §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit throat, drow, dermat; in animals: card arrhy	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, heart
Clothing: Repeat Goggles: Any poss Wash: Immed contam Change: N.R. Remove: Immed wet (flamm) Provide: > 1%: Eyewash, quick drench	OSHA 250 ppm: SA,CFE 500 ppm: SCBAF/SAF 1000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFS/SCBAE	Inh Ing Abs Con	Irrit eyes, resp sys, skin	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, eyes, skin

Triethylamine

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Trifluorobromomethane CBrF ₃ 75-63-8 PAS425000	Bromotrifluoromethane, Fluorocarbon 1301, Freon® 13B1, Halocarbon 13B1, Halon® 1301, Monobromotrifluoromethane, Refrigerant 13B1, Trifluoromonobromomethane	NIOSH/OSHA 1000 ppm (6100 mg/m ³)	50,000 ppm	Colorless, odorless gas. [Note: Shipped as a liquefied compressed gas.]	MW: 148.9 BP: -72°F Sol: 0.03% FLP: NA IP: 11.78 eV	VP: >1 atm FRZ: -267°F UEL: NA LEL: NA	Chemically active metals such as calcium, powdered aluminum, zinc & magnesium	Char(2); CH ₂ Cl ₂ ; GC/FID; III [#1017]
1009 12	1 ppm = 6.19 mg/m ³				Nonflammable Gas			
2,4,6-Trinitrotoluene CH ₂ C ₆ H ₂ (NO ₂) ₃ 118-96-7 XU0175000	1-Methyl-2,4,6-trinitrobenzene; TNT; Trinitrotoluene; sym-Trinitrotoluene; Trinitrotoluol	NIOSH/OSHA 0.5 mg/m ³ [skin]	N.E.	Colorless to pale-yellow, odorless solid or crushed flakes. [Note: Classified as a high explosive.]	MW: 227.1 BP: 484°F (Explodes) Sol(77°F): 0.01% FLP: ? (Explodes) IP: 10.59 eV Sp.Gr: 1.65 Combustible Solid	VP(180°F): 0.05 mm MLT: 176°F UEL: ? LEL: ?	Strong oxidizers, ammonia, strong alkalis, combustible materials, heat [Note: Rapid heating will result in detonation.]	Tenax GC; Acetone; GC/TEA; OSHA [#44]
1356 33 (wet)								
Triorthocresyl phosphate (C ₆ H ₄ (H ₃ C) ₃) ₃ PO 78-30-8 TD0350000	TCP, TOCP, Tri-o-cresyl ester of phosphoric acid, Tri-o-cresyl phosphate, o-Trinitrotoluol	NIOSH/OSHA 0.1 mg/m ³ [skin]	40 mg/m ³	Colorless to pale-yellow, odorless liquid or solid (below 52°F).	MW: 368.4 BP: 770°F (Decomposes) Sol: Slight FLP: 437°F IP: ?	VP(77°F): 0.00002 mm FRZ: 52°F UEL: ? LEL: ?	Oxidizers	Filter; Diethyl ether; GC/TEA; III(3) [#S209]
2574 55	1 ppm = 15.31 mg/m ³				Sp.Gr: 1.20 Class IIIB Combustible Liquid			
Triphenyl phosphate (C ₆ H ₅ O) ₃ PO 115-86-6 TC8400000	Phenyl phosphate, TPP, Triphenyl ester of phosphoric acid	NIOSH/OSHA 3 mg/m ³	N.E.	Colorless, crystalline powder with a phenol-like odor.	MW: 326.3 BP: 776°F Sol: Insoluble FLP: 428°F IP: ?	VP(380°F): 1 mm MLT: 120°F UEL: ? LEL: ?	None reported	Filter; Diethyl ether; GC/FPD; III(3) [#S210]
					Sp.Gr: 1.29 Combustible Solid			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 10,000 ppm: SA/SCBA 25,000 ppm: SA/CF 50,000 ppm: SCBAF/SAF/SAT/CF g: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFOV/SCBAE	Inh Con (liq)	LI-head; card arrhy	Breath: Resp support	Heart, CNS	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam/daily Change: Alter work if reason prob contam Remove: Prompt non-imperv contam	NIOSH/OSHA 5 mg/m ³ : SA*/SCBA* 12.5 mg/m ³ : SA/CF* 25 mg/m ³ : SCBAF/SAF 1000 mg/m ³ : SAF-PD, PP g: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: GMFOVHIE/SCBAE	Inh Abs Ing Con	Liver damage; jaun; cyan; sneezing; cough; sore throat; peri neur, musc pain; kidney damage; cataract; sans dem; leucyt; anemia; card irregularities	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Blood, liver, eyes, CVS, CNS, kidneys, skin	
Clothing: Repeat Goggles: N.R. Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 0.5 mg/m ³ : DM 1 mg/m ³ : DMXSO/SA/SCBA 2.5 mg/m ³ : PAPRDM/SA/CF 5 mg/m ³ : HIEF/PAPRTHIE/SCBAF/SAF/SAT/CF 40 mg/m ³ : SA-PD, PP g: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	GI dist; peri neur; cramps in calves, pares in feet or hands; weak feet, wrist drop, para	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	PNS, CNS	
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 15 mg/m ³ : D 30 mg/m ³ : DXSQ/SA/SCBA/HIE 75 mg/m ³ : PAPRDM/SA/CF 150 mg/m ³ : HIEF/PAPRTHIE/SAT/CF SCBAF/SAF 1500 mg/m ³ : SA-PD, PP g: SCBAF-PD, PP/SAF-PD, PP-ASCBA Escape: HIEF/SCBAE	Inh Ing	Minor changes in blood enzymes; in animals: musc weak, para	Breath: Resp support Swallow: Medical attention immed	Blood	

Triphenyl phosphate

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, F.P., IP, Sp.Gr., flammability	VP, FRZ UEL, LEL		
Turpentine $C_{10}H_{16}$ (approx) 8006-64-2 Y08400000	Gumspirits, Gum turpentine, Spirits of turpentine, Siem distilled turpentine, Sulfate wood turpentine, Turps, Wood turpentine	NIOSH/OSHA 100 ppm (560 mg/m ³)	1500 ppm	Colorless liquid with a characteristic odor.	MW: 136(approx) BP: 309-338°F Sol: Insoluble F.P.: 95°F IP: ?	VP(77°F): 5 mm FRZ: -58 to -76°F UEL: ? LEL: 0.8%	Strong oxidizers, chlorine, chromic anhydride, stannic chloride	Char; CS ₂ ; GC/FID; III [#1551]
1299 27	1 ppm = 5.65 mg/m ³				Sp.Gr: 0.86 Class IC Flammable Liquid			
Uranium (insoluble compounds as U) U 7440-61-1 (Metal) YR3490000 (Metal) 2979 65 (Metal) 9175 65 (Metal)	Metal: Uranium I Synonyms of other insoluble compounds vary depending upon the specific compound.	NIOSH Ca See Appendix A 0.2 mg/m ³ ST 0.6 mg/m ³ OSHA 0.2 mg/m ³ ST 0.6 mg/m ³	Ca [30 mg/m ³]	Metal: Silver-white, malleable, ductile, lustrous solid. [Note: Weakly radioactive.]	MW: 238.0 BP: 6895°F Sol: Insoluble F.P.: ? IP: NA	VP: 0 mm (approx) MLT: 2097°F UEL: ? LEL: ?	Carbon dioxide, carbon tetrachloride, nitric acid, fluorine [Note: Complete coverage of uranium metal scrap with oil is essential for prevention of fire.]	None available
					Sp.Gr(77°F): 19.05 (Metal) Metal: Combustible Solid, especially turnings and powder.			
Uranium (soluble compounds as U)	Synonyms vary depending upon the specific soluble compound.	NIOSH Ca See Appendix A 0.05 mg/m ³ OSHA 0.05 mg/m ³	Ca [20 mg/m ³]	Appearance and odor vary depending upon the specific soluble compound.	Properties vary depending upon the specific soluble compound.		Uranyl nitrates: combustibles. Uranium hexafluoride: water.	None available
Vanadium pentoxide (respirable dust as V ₂ O ₅) V ₂ O ₅ 1314-62-1 YW2450000 2862 55	Divanadium pentoxide, Vanadic anhydride, Vanadium oxide, Vanadium pentoxide	NIOSH C 0.05 mg/m ³ [15-min] OSHA 0.05 mg/m ³	70 mg/m ³	Yellow-orange powder or dark gray, odorless flakes dispersed in air.	MW: 181.9 BP: 3182°F (Decomposes) Sol: 0.8% F.P.: NA IP: NA	VP: 0 mm (approx) MLT: 1274°F UEL: NA LEL: NA	Lithium, chlorine trifluoride	Filter; THF; XRD; III [#7504]
					Sp.Gr: 3.36 Noncombustible Solid, but may increase intensity of fire when in contact with combustible materials.			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards					
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)		
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Immed wet (flamm)	NIOSH/OSHA 1000 ppm: CCRFOV/PAPROV* 1500 ppm: SA,CF ¹ /GMFOV/SCBAF/SAF §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; head, vert; hema, album; skin irrit, sens	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, eyes, kidneys, resp sys	
Clothing: Repeat Goggles: Any poss Wash: Prompt contam Change: After work if reason Remove: prob contam Prompt non-imperv contam Provide: Eyewash	NIOSH v: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Con Ing	Derm; [carc]; in animals: lung, lymph node damage; derm	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Skin, bone marrow, lymphatics	
Clothing: Any poss UF ₁ /Repeat Goggles: Any poss Wash: Prompt contam/UF ₁ ; Immed contam and daily Change: After work if reason prob contam/UF ₁ ; After work if any poss contam Remove: Prompt non-imperv contam/ UF ₁ ; Immed non-imperv contam Provide: Eyewash (UF ₃),quick drench	NIOSH v: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape(Halides): GMFAGHIE/SCBAE Escape(Non-halides): HIEF/SCBAE	Inh Con Ing	Lac, con; short breath, cough, chest rales; nau, vomit; skin burns; RBC, casts in urine; album; high BUN; [carc]	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Resp sys, blood, liver, kidneys, lymphatics, skin, bone marrow	
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	NIOSH/OSHA 0.5 mg/m ³ : HIE*/SA*/SCBA* 1.25 mg/m ³ : SA,CF ¹ /PAPRHIE* 2.5 mg/m ³ : HIEF/SCBAF/SAF/ PAPRHIE* 70 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP-ASCBA Escape: HIEF/SCBAE	Inh Ing Con	Irrit eyes; green tongue, metallic taste, eczema; cough; fine rales, wheez, bron, dysp; irrit throat	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, skin, eyes	

Vanadium pentoxide (respirable dust as V₂O₅)

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide No.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Vanadium pentoxide (respirable fume as V_2O_5) V_2O_5 1314-62-1 YW2460000 2862 55	Divanadium pentoxide, Vanadic anhydride, Vanadium oxide, Vanadium pentoxide	NIOSH C 0.05 mg/m ³ [15-min] OSHA 0.05 mg/m ³	70 mg/m ³	Finely divided particulate dispersed in air.	MW: 181.9 BP: 3182°F (Decomposes) Sol: 0.1% FLP: NA IP: NA Sp.Gr: 3.36 Noncombustible Solid	VP: 0 mm (approx) MLT: 1274°F UEL: NA LEL: NA	Lithium, chlorine trifluoride	Filter: TSP; XRD; III [#7504]
Vinyl chloride $CH_2=CHCl$ 75-01-4 KU9625000 1086 17	Chloroethene, Chloroethylene, Ethylene monochloride, Monochloroethene, Monochloroethylene, VC, Vinyl chloride monomer (VCM)	NIOSH Ca See Appendix A Lowest reliably detectable concentration. OSHA [1910.1017] 1 ppm C 5 ppm [15-min]	Ca ACGIH A1	Colorless gas or liquid (below 56°F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.]	MW: 62.5 BP: 7°F Sol(77°F): 0.1% FLP: NA (Gas) IP: 9.99 eV Flammable Gas	VP: >1 atm FRZ: -256°F UEL: 33.0% LEL: 3.6%	Copper, oxidizers, aluminum, peroxides, iron, steel [Note: Polymerizes in air, sunlight, or heat unless stabilized by inhibitors such as phenol. Attacks iron & steel in presence of moisture.]	Char(2); CS; GC/FID; III [#1007]
Vinyl toluene $CH_2=CHC_6H_4CH_3$ 25013-15-4 WL5075000 2618 27	Ethenylmethylbenzene, Methylstyrene, Tolyethylene	NIOSH/OSHA 100 ppm (480 mg/m ³) ACGIH 50 ppm (240 mg/m ³)	5000 ppm	Colorless liquid with a strong, disagreeable odor.	MW: 118.2 BP: 339°F Sol: 0.009% FLP: 120°F IP: 8.20 eV Sp.Gr: 0.89 Class II Combustible Liquid	VP: 1 mm FRZ: -106°F UEL: 11.0% LEL: 0.8%	Oxidizers, peroxides, strong acids, iron or aluminum salts [Note: Usually inhibited with tert-butyl catechol to prevent polymerization.]	Char; CS; GC/FID; III Aromatic Hydrocarbons [#1501]
Warfarin $C_{19}H_{16}O_4$ 81-81-2 GN4550000 3027 55 (Coumarin derivative pesticide)	3-(alpha-Acetyl)-benzyl-4-hydroxycoumarin, 4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2H-1-benzopyran-2-one, WARF	NIOSH/OSHA 0.1 mg/m ³	350 mg/m ³	Colorless, odorless, crystalline powder. [pesticide]	MW: 308.3 BP: Decomposes Sol: 0.002% FLP: ? IP: ? Combustible Solid	VP(71°F): 0.09 mm MLT: 322°F UEL: ? LEL: ?	Strong oxidizers	Filter: Methano; HPLC/UVD; III [#5002]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 0.5 mg/m ³ : HIE*/SA*/SCBA* 1.25 mg/m ³ : SA,CF*/PAPR/HIE* 2.5 mg/m ³ : HIEF/SCBAF/SAF/ PAPR/HIE* 70 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Con	Irrit eye; green tongue, metallic taste; irrit throat, cough, fine rales, wheez, bron, dysp; eczema	Breath: Resp support	Resp sys, skin, eyes
Clothing: Any poss Goggles: Any poss Wash: Immed contam/daily Change: After work if any poss contam Remove: Immed contam Provide: Eyewash, quick drench	NIOSH §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFS/SCBAE	Inh	Weak; abdom pain, GI bleeding; hepatomegaly; pallor or cyan of extremities. [carb]	Breath: Resp support	Liver, CNS, blood, resp sys, lymphatic sys
Clothing: Repeat Goggles: Reason prob Wash: Prompt contam Change: N.R. Remove: Prompt non-imperv contam	ACGIH 500 ppm: CCR0V*/SA*/SCBA* 1000 ppm: PAPROV*/CCRFOV 1250 ppm: SA,CF* 2500 ppm: GMFOV/SCBAF/SAF 5000 ppm: SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Con Ing	Irrit eyes, skin, upper resp sys; drow	Eye: Irr immed Skin: Soap flush prompt Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys
Clothing: Repeat Goggles: N.R. Wash: Prompt contam Change: Alter work if any poss contam Remove: Prompt non-imperv contam	NIOSH/OSHA 0.5 mg/m ³ : DM 1 mg/m ³ : DMXSQ/SA/SCBA 2.5 mg/m ³ : PAPRDM/SA,CF 5 mg/m ³ : HIEF/PAPR/HIE/SCBAF/SAF/ SAT,CF 100 mg/m ³ : SA-PD,PP 200 mg/m ³ : SAF-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Abs Ing Con	Hema, back pain; hematoma arms, legs; epis. bleeding lips, muc memb hemorrh; abdom pain, vomit, fecal blood; petechial rash; abnormal hematologic indices	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed	Blood, CVS

Wartarin

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL, FLP, IP, Sp.Gr, flammability	VP, FRZ, UEL, LEL		
Xylenes (o-, m-, p-isomers) $C_6H_4(CH_3)_2$ 1330-20-7 ZE2100000 1307 27	o: 1,2-Dimethylbenzene; o-Xyloil; m: 1,3-Dimethylbenzene; m-Xyloil; p: 1,4-Dimethylbenzene; p-Xyloil 1 ppm = 4.41 mg/m ³	NIOSH/OSHA 100 ppm (435 mg/m ³) ST 150 ppm (655 mg/m ³)	1000 ppm	Colorless liquids with an aromatic odor. [Note: Pure p-xylene is a solid below 56°F.]	MW: 106.2 BP: 292/269/ 281°F Sol: Insoluble FLP: 63/84/ 81°F IP: 8.56/8.56/8.44 gV Sp.Gr: 0.88/0.86/0.86 Class IB Flammable Liquid (o) Class IC Flammable Liquids (m,p)	VP: 7/9/9 mm FRZ: -13/ -54/56°F UEL: 7.0/7.0/7.0% LEL: 1.1/1.0/1.1%	Strong oxidizers	Char; CS; GC/FID; III [#1501, Aromatic Hydro- carbons]
Xylidine $(CH_3)_2C_6H_3NH_2$ 1300-73-8 ZE8575000 1711 55	Aminodimethylbenzene, Aminoxylene, Dimethylaminobenzene, Dimethylaniline, Xylidine isomers, Xylidine (mixed o-, m-, p-) 1 ppm = 5.04 mg/m ³	NIOSH/OSHA 2 ppm (10 mg/m ³) [skin]	150 ppm	Pale-yellow to brown liquid with a weak, aromatic, amine-like odor.	MW: 121.2 BP: 415-439°F Sol: Slight FLP: 206°F IP: ? Sp.Gr: 0.98 Class III B Combustible Liquid	VP: <1 mm FRZ: ? UEL: ? LEL: 1.0%	Strong oxidizers, hypochlorite bleaches	Si gel; Ethanol; GC/FID; III [#2002]
Yttrium compounds (as Y) Y 7440-65-5 (Metal) ZG2980000 (Metal)	Metal: Yttrium metal Synonyms of other compounds vary depending upon the specific compound.	NIOSH/OSHA 1 mg/m ³	N.E.	Metal: Dark gray to black solid.	MW: 88.9 BP: 5301°F Sol: ? FLP: NA IP: NA Sp.Gr: 4.47 Noncombustible Solid in bulk form.	VP: 0 mm (approx) MLT: 2732°F UEL: NA LEL: NA	Oxidizers	Filter; Acid; ICP; III [#7300, Elements]
Zinc chloride fume $ZnCl_2$ 7646-85-7 ZH1400000	None	NIOSH/OSHA 1 mg/m ³ ST 2 mg/m ³	4800 mg/m ³	White particulate dispersed in air.	MW: 136.3 BP: 1350°F Sol(77°F): 432% FLP: NA IP: NA Sp.Gr(77°F): 2.91 Noncombustible Solid	VP: 0 mm (approx) MLT: 554°F UEL: NA LEL: NA	Potassium	None available

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection – maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)	
Clothing:	Repeat	NIOSH/OSHA 1000 ppm: CCROV*/PAPROV*/SA*/SCBA* §: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh	Dizz, excitement, drow, inco, staggering gait; irrit eyes, nose, throat; corneal vacuolization; anor, nau, vomit, abdom pain; derm	Eye:	Irr immed	CNS, eyes, GI tract, brood, liver, kidneys, skin
Goggles:	Reason prob		Abs		Skin:	Soap wash prompt	
Wash:	Prompt contam		Ing		Breath:	Resp support	
Change:	N.R.		Con		Swallow:	Medical attention immed	
Remove:	Immed wet (flamm)						
Clothing:	Any poss	NIOSH/OSHA 20 ppm: CCROV/SA/SCBA 50 ppm: SA:CF/PAPROV 100 ppm: CCRFOV/PAPRTOV/GMFOV/SCBAF/SAF 150 ppm: SA:PD,PP §: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh	Anoxia, cyan; lung, liver, kidney damage	Eye:	Irr immed	Blood, lungs, liver, kidneys, CVS
Goggles:	Any poss		Abs		Skin:	Soap wash immed	
Wash:	Immed contam		Ing		Breath:	Resp support	
Change:	N.R.		Con		Swallow:	Medical attention immed	
Remove:	Immed non-imperv contam						
Provide:	Eyewash, quick drench						
Clothing:	N.R.	NIOSH/OSHA 5 mg/m ³ : DM 10 mg/m ³ : DMXSQ/SA/SCBA 25 mg/m ³ : PAPRDM/SA,CF 50 mg/m ³ : HIEF/PAPRTHIE/SAT,CF/SCBAF/SAF 500 mg/m ³ : SA:PD,PP §: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: HIEF/SCBAE	Inh	Irrit eyes; in animals: pulm irrit; eye inj; possible liver damage	Eye:	Irr immed	Eyes, lungs
Goggles:	Any poss		Ing		Skin:	Soap wash prompt	
Wash:	N.R.		Con		Breath:	Resp support	
Change:	N.R.				Swallow:	Medical attention immed	
Remove:	N.R.						
Provide:	Eyewash						
Clothing:	N.R.	NIOSH/OSHA 10 mg/m ³ : DMFu*/SA*/SCBA* 25 mg/m ³ : PAPRDMFu*/SA,CF* 50 mg/m ³ : HIEF/PAPRTHIE*/SCBAF/SAF 2000 mg/m ³ : SAF/PD,PP §: SCBAF/PD,PP/SAF/PD,PP:ASCBA Escape: HIEF/SCBAE	Inh	Conj; irrit nose, throat; cough, copious sputum; dysp, chest pain, pulm edema, broncopneus; pulm fib, cor pulmonale; fever; cyan; tachypnea; burn skin; irrit skin, eyes	Breath:	Resp support	Resp sys, skin, eyes
Goggles:	N.R.		Con				
Wash:	N.R.						
Change:	N.R.						
Remove:	N.R.						

Zinc chloride fume

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL FLP, IP, Sp.Gr, flammability	VP, FRZ UEL, LEL		
Zinc oxide fume ZnO 1314-13-2 ZH4810000	None	NIOSH/OSHA 5 mg/m ³ ST 10 mg/m ³	N.E.	Fine white, odorless particulate dispersed in air.	MW: 81.4 BP: ? Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 3587°F UEL: NA LEL: NA	Chlorinated rubber (at 419°F)	Filter: none; XRD; III [#7502]
					Sp.Gr: 5.61 Noncombustible Solid			
Zirconium compounds (as Zr) Zr 7440-67-7 (Metal) ZH7070000 (Metal)	Metal: Zirconium metal Synonyms of other compounds vary depending upon the specific compound.	NIOSH 5 mg/m ³ ST 10 mg/m ³ [Zr compounds excluding Zirconium tetrachloride.] OSHA 5 mg/m ³ ST 10 mg/m ³	500 mg/m ³	Metal: Soft, malleable, ductile, solid or gray to gold amorphous powder.	MW: 91.2 BP: 6471°F Sol: Insoluble FLP: NA IP: NA	VP: 0 mm (approx) MLT: 3375°F UEL: NA LEL: NA	Potassium nitrate, oxidizers [Note: Fine powder may be stored completely immersed in water.]	Filter Acid; ICP; III [#7300, Elements]
2008 37 (metal powder, dry) 1358 32 (metal powder, wet)					Sp.Gr: 6.51 Metal: Combustible, but solid form is difficult to ignite; however, powder form may ignite SPONTANEOUSLY and can continue burning under water.			

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)		Target organs (See Table 5)
Clothing: N.R. Goggles: N.R. Wash: N.R. Change: N.R. Remove: N.R.	NIOSH/OSHA 50 mg/m ³ : DMFu/SA/SCBA 125 mg/m ³ : PAPRDMFu/SA:CF 250 mg/m ³ : HIEF/PAPRTHIE/SAT:CF SCBAF/SAF 2500 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh	Sweet, metallic taste; dry throat, cough; chills, fever; light chest, dysp, rales, reduced pulm func; head; blurred vision; muscle cramps, low back pain; nau, vomit; fig, lass, mal	Breath:	Resp support	Resp sys
Recommendations vary depending upon the specific compound.	NIOSH/OSHA 25 mg/m ³ : DM 50 mg/m ³ : DMXSO/SA/SCBA 125 mg/m ³ : PAPRDM/SA:CF 250 mg/m ³ : HIEF/PAPRTHIE/SAT:CF/ SCBAF/SAF 500 mg/m ³ : SA-PD,PP §: SCBAF-PD,PP/SAF-PD,PP:ASCBA Escape: HIEF/SCBAE	Inh Con	Skin granulomas; in animals: X-ray evidence of retention in lungs; irrit skin, muc memb	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Resp sys, skin

APPENDIX A — NIOSH OCCUPATIONAL CARCINOGENS

NIOSH has identified numerous chemicals that should be treated as occupational carcinogens even though OSHA has not identified them as such. In determining their carcinogenicity, NIOSH uses a classification outlined in 29 CFR 1990.103, which states in part:

Potential occupational carcinogen means any substance, or combination or mixture of substances, which causes an increased incidence of benign and/or malignant neoplasms, or a substantial decrease in the latency period between exposure and onset of neoplasms in humans or in one or more experimental mammalian species as the result of any oral, respiratory or dermal exposure, or any other exposure which results in the induction of tumors at a site other than the site of administration. This definition also includes any substance which is metabolized into one or more potential occupational carcinogens by mammals.

NIOSH has not identified thresholds for carcinogens that will protect 100% of the population. NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concentration. To ensure maximum protection from carcinogens through the use of respiratory protection, only the most reliable and protective respirators are recommended. These include (1) a self-contained breathing apparatus (SCBA) that has a full facepiece and is operated in a positive-pressure mode, or (2) a supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in a pressure-demand or other positive-pressure mode.

APPENDIX B — THIRTEEN OSHA-REGULATED CARCINOGENS

Without establishing PELs, OSHA promulgated standards in 1974 to regulate the industrial use of 13 chemicals identified as occupational carcinogens (2-acetylaminofluorene, 4-aminodiphenyl, benzidine, bis-chloromethyl ether, 3,3'-dichlorobenzidine, 4-dimethylaminoazobenzene, ethyleneimine, methyl chloromethyl ether, alpha-naphthylamine, beta-naphthylamine, 4-nitrobiphenyl, N-nitrosodimethylamine, and beta-propiolactone). Exposures of workers to these 13 chemicals are to be controlled through the required use of engineering controls, work practices, and personal protective equipment, including respirators. See 29 CFR 1910.1003–1910.1016 for specific details of these requirements.

Respirator selections in the *Pocket Guide* are based on NIOSH policy, which considers the 13 chemicals to be potential occupational carcinogens.

APPENDIX C — SUPPLEMENTARY EXPOSURE LIMITS

Asbestos

NIOSH considers asbestos to be a carcinogen and recommends that exposures be reduced to the lowest possible concentration. For asbestos fibers >5 micrometers in length, NIOSH recommends an REL of 100,000 fibers per cubic meter of air (100,000 fibers/m³), which is equal to 0.1 fiber per cubic centimeter of air (0.1 fiber/cm³), as determined by a 400-liter air sample and NIOSH Analytical Method #7400.

The OSHA PEL for asbestos fibers is an 8-hour TWA airborne concentration of 0.2 fiber (longer than 5 micrometers and having a length-to-diameter ratio of at least 3 to 1) per cubic centimeter of air (0.2 fiber/cm³), as determined by the membrane filter method at approximately 400X magnification with phase contrast illumination. An "action level" of 0.1 fiber/cm³ as an 8-hour TWA was established as the concentration above which employers must initiate compliance activities such as worker training and medical surveillance.

ACGIH designates asbestos as a confirmed human carcinogen (A1) with the following TLVs: amosite, 0.5 fiber/cm³; chrysotile, 2 fibers/cm³; crocidolite, 0.2 fiber/cm³; and other forms, 2 fibers/cm³. ACGIH considers "fibers" to be those particles >5 micrometers in length with an aspect ratio equal to or greater than 3:1 as determined by the membrane filter method at 400 to 450X magnification (4-mm objective) with phase contrast illumination.

Chromic Acid and Chromates (as CrO₃), Chromium(II) and Chromium(III) Compounds (as Cr), and Chromium Metal (as Cr)

The NIOSH REL (10-hour TWA) is 0.001 mg Cr(VI)/m³ for all hexavalent chromium [Cr(VI)] compounds. NIOSH considers all Cr(VI) compounds (including chromic acid) to be potential

APPENDIX C — SUPPLEMENTARY EXPOSURE LIMITS (Continued)

occupational carcinogens. The NIOSH REL (8-hour TWA) is 0.5 mg Cr/m³ for chromium metal and chromium(II) and chromium(III) compounds.

The OSHA PEL is 0.1 mg CrO₃/m³ (ceiling) for chromic acid and chromates; 0.5 mg Cr/m³ (8-hour TWA) for chromium(II) and chromium(III) compounds; and 1 mg Cr/m³ (8-hour TWA) for chromium metal.

ACGIH has various TLVs for chromium compounds. The 8-hour TWA is 0.5 mg Cr/m³ for chromium metal, for chromium(II) compounds (e.g., chromous chloride and chromous sulfate), and for chromium(III) compounds (e.g., chromic oxide, chromic sulfate, chromic chloride, chromic potassium sulfate, and chromite ore). The 8-hour TWA is 0.05 mg Cr(VI)/m³ for water-soluble Cr(VI) compounds, which include chromic acid and its anhydride, and the monochromates and dichromates of sodium, potassium, ammonium, lithium, cesium, and rubidium. The 8-hour TWA is 0.05 mg Cr/m³ for certain water-insoluble Cr(VI) compounds that are designated as confirmed human carcinogens (A1) (including zinc chromate, calcium chromate, lead chromate, barium chromate, strontium chromate, and sintered chromium trioxide).

Coal Tar Pitch Volatiles

The OSHA PEL (8-hour TWA) for coal tar pitch volatiles is 0.2 mg/m³ (benzene-soluble fraction). OSHA defines "coal tar pitch volatiles" as the fused polycyclic hydrocarbons that volatilize from the distillation residues of coal, petroleum, wood, and other organic matter such as anthracene, benzo(a)pyrene (BaP), phenanthrene, acridine, chrysene, pyrene, etc. Asphalt is not covered under the OSHA standard for coal tar pitch volatiles.

APPENDIX C — SUPPLEMENTARY EXPOSURE LIMITS (Continued)

NIOSH considers coal tar products (i.e., coal tar, coal tar pitch, or creosote) to be carcinogenic (Ca); the NIOSH REL (10-hour TWA) for coal tar products is 0.1 mg/m³ (cyclohexane-extractable fraction).

ACGIH designates coal tar pitch volatiles as a confirmed human carcinogen (A1) with an 8-hour TWA of 0.2 mg/m³ (benzene-solubles).

Cotton Dust (raw)

The NIOSH REL for cotton dust is 0.200 mg/m³ (lint-free cotton dust).

As found in the OSHA Table Z-1-A (29 CFR 1910.1000), the PEL for cotton dust (raw) is 1 mg/m³ for the cotton waste processing operations of waste recycling (sorting, blending, cleaning, and willowing) and ginning. PELs for other sectors (as found in 29 CFR 1910.1043) are 0.200 mg/m³ for yarn manufacturing and cotton washing operations, 0.500 mg/m³ for textile mill waste house operations or for dust from "lower grade washed cotton" used during yarn manufacturing, and 0.750 mg/m³ for textile slashing and weaving operations. The OSHA standard in 29 CFR 1910.1043 does not apply to cotton harvesting, ginning, or the handling and processing of woven or knitted materials and washed cotton. All PELs for cotton dust are mean concentrations of lint-free, respirable cotton dust collected by the vertical elutriator or an equivalent method and averaged over an 8-hour period.

The ACGIH TLV for cotton dust (raw) is 0.200 mg/m³ (lint-free dust) as an 8-hour TWA measured by the vertical elutriator cotton-dust sampler.

APPENDIX D — SUBSTANCES WITH NO ESTABLISHED RELs

After reviewing available published literature, NIOSH provided comments to OSHA on August 1, 1988, regarding the "Proposed Rule on Air Contaminants" (29 CFR 1910, Docket No. H-020). In these comments, NIOSH questioned whether the PELs proposed for the following substances included in the *Pocket Guide* were adequate to protect workers from recognized health hazards: acetylene tetrabromide, chlorobenzene, ethyl bromide, ethyl chloride, ethyl ether, furfural, isopropyl acetate, isopropylamine, molybdenum (soluble compounds as Mo), nitromethane, and silica (amorphous). At that time, NIOSH also conducted a limited evaluation of the literature on magnesium oxide fume and molybdenum (insoluble compounds as Mo) and concluded that the documentation cited by OSHA was inadequate to support the proposed PELs of 10 mg/m³.

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