

NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND
SUPPORTING DOCUMENTATION FOR

*** VINYL TOLUENE ***

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

The basic text of this document contains the draft technical standard approved by the Joint Review Committee of the NIOSH/OSHA Standards Completion Program and the supporting documentation for the substance VINYL TOLUENE.

The SCP draft technical standards are recommendations to the Department of Labor for its consideration in rulemaking and have no legal status until final rules have been promulgated by that agency. This draft standard is provided for your information only.

The References and Sources, Respirator Table Documentation and Use/Exposure and Control Documentation are the working documents used by the various SCP working groups during the development of the draft technical standard and serve as the technical foundation for the standard. The classification for each substance and the regulatory statements were derived following a decision logic established for the various sections of the standard.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

- (a) DEFINITIONS
 - (1) PERMISSIBLE EXPOSURE - "Permissible Exposure" means inhalation of vinyl toluene in concentrations not in excess of 100 parts per million (ppm) (480 milligrams per cubic meter, mg/cu.m.) averaged over an 8-hour work shift, as stated in section 1910.93, Table G-1.
 - (2) ACTION LEVEL - "Action Level" means one half (1/2) of the permissible exposure for vinyl toluene.
- (b) EMPLOYEE INFORMATION - Each employer who has a workplace in which vinyl toluene is present shall:
 - (1) STANDARD AVAILABILITY - Keep a copy of this section with its appendices at the workplace. This material shall be made readily available to affected employees; and
 - (2) PRESENCE OF VINYL TOLUENE - Inform affected employees of the quantity, location, and manner of use or storage of vinyl toluene.
- (c) EXPOSURE MEASUREMENT
 - (1) INITIAL DETERMINATION - Each employer who has a place of employment in which vinyl toluene is released into the workplace air shall determine if any employee may be exposed to airborne concentrations of vinyl toluene at or above the action level. The determination shall be made each time there is a change in production, process, or control measures which could result in an increase in airborne concentrations of vinyl toluene. A written determination shall be made and it shall contain at least the following information:
 - (i) Any information, observations, or calculations which would indicate employee exposure to vinyl toluene;
 - (ii) Any measurements of airborne concentrations of vinyl toluene taken;
 - (iii) Any employee complaints of symptoms which may be attributable to exposure to vinyl toluene; and
 - (iv) Date of determination, work being performed at the time, location within work site, name, and social security number of each employee considered.
 - (2) INITIAL EXPOSURE MEASUREMENT - If the employer determines that any employee may be exposed to airborne concentrations of vinyl toluene at or above the action level, the exposure of the employee believed to have the greatest exposure shall be measured. The exposure measurement shall be representative of the maximum exposure of the employee.
 - (3) IDENTIFICATION OF EXPOSED EMPLOYEES - If the exposure measurement taken under paragraph (c)(2) of this section reveals employee exposure to airborne concentrations of vinyl toluene at or above the action level, the employer shall:
 - (i) Identify all employees who may be exposed at or above the action level; and
 - (ii) Measure the exposure of the employees so identified.
 - (4) EXPOSURE ABOVE THE ACTION LEVEL - If an employee exposure measurement reveals that an employee is exposed to airborne concentrations of vinyl toluene at or above the action level, but not above the permissible exposure, the exposure of that employee shall be measured at least every two months.
 - (5) EXPOSURE ABOVE THE PERMISSIBLE EXPOSURE - If an employee exposure measurement reveals that an employee is exposed to airborne

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

concentrations of vinyl toluene above the permissible exposure, the employer shall:

- (i) Inform the employee of the exposure as required by paragraph (N)(1) of this section; and
- (ii) Measure the exposure of the employee at least monthly; and
- (iii) Institute control measures as required by paragraph (E) of this section.

(6) **TERMINATION OF EXPOSURE MEASUREMENT** - If two consecutive employee exposure measurements taken at least one week apart reveal that the employee is exposed to airborne concentrations of vinyl toluene below the action level, the employer may terminate measurement for the employee. For purposes of this subparagraph, use of respirators shall not constitute reduction of employee exposure below the action level.

(d) **METHODS OF MEASUREMENT** - An employee's exposure shall be obtained by any combination of long term or short term samples which represents the employee's actual exposure averaged over an eight hour work shift (Appendix B (iv)). The method of measurement shall have an accuracy, to a confidence level of 95%, of not less than that given in Table 1 below.

Table 1

Concentration	Required Accuracy
Above permissible exposure	Plus or Minus 25%
At or below permissible exposure and above the action level	Plus or Minus 35%
At or below the action level	Plus or Minus 50%

(e) **Methods of compliance**

(1) **Engineering controls** - No employee shall be exposed to vinyl toluene above the permissible limit as defined in paragraph (a)(1) of this section. Engineering and work practice controls shall be used to reduce exposure to vinyl toluene to at or below the permissible exposure.

(i) When mechanical ventilation is used to control exposure, measurements which demonstrate system efficiency (for example: air velocity, static pressure, or air volume) shall be made at least every three months. Measurements of system efficiency shall also be made within five work days of any change in production, process, or control which might result in a reduction in control.

(ii) Where a fan is located in duct work and where vinyl toluene is present in concentrations greater than 2000 ppm, one fourth of the lower flammable limit, the fan rotating element shall be of nonsparking material or the casing shall consist of, or be lined with, nonsparking material. There shall be sufficient clearance between the fan rotating element and the fan casing so as to prevent contact.

(2) **Respirators**

(i) Compliance with the permissible exposure may not be achieved by the use of respirators except:

- (a) During the time period necessary to install engineering controls; or
- (b) In work situations in which engineering controls are technically not feasible; or

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

- (c) In work situations in which feasible engineering and work practice controls are insufficient to reduce employee exposure to at or below the permissible exposure. Where technically feasible engineering and work practice controls are not sufficient to reduce exposure to at or below permissible exposure, they shall be used to reduce exposure to the lowest level feasible; or
- (d) For operations not exceeding 40 hours per year; or
- (e) In emergencies.
- (ii) Respirators shall be jointly approved by the Mining Enforcement and Safety Administration (formerly Bureau of Mines) and by the National Institute for Occupational Safety and Health under the provisions of 30 CFR Part 11.
- (iii) Employers shall select and provide the appropriate respirator from Table 2 and shall ensure that the employee uses the respirator provided.
- (iv) Employers shall institute a respiratory protection program in accordance with sections 1910.134(b),(d),(e),(f) and (g).

TABLE 2. RESPIRATORY PROTECTION FOR VINYL TOLUENE

Condition	Permissible Respiratory Protection
Vapor Concentration	
Equal to or Less than 400 ppm	cartridge(s). Any supplied-air respirator.
Equal to or Less than 1000 ppm	and organic vapor cartridge(s).
Equal to or Less than 5000 ppm	A gas mask with a front or back-mounted organic vapor canister. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece.
Equal to or Less than 7000 ppm	piece operated in pressure-demand (positive pressure) mode or with a full facepiece, hood, or helmet operated in continuous mode.
Greater than 7000	Self-contained breathing apparatus with a full face-

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

ppm or Entry &
Escape from Un-
Known Concentrations

supplied-air respirator with a full facepiece operated in pressure-demand (positive pressure) or continuous flow mode and an auxiliary self-contained air supply operated in pressure-demand mode.

Fire Fighting

Self-contained breathing apparatus with a full facepiece operated in pressure-demand (positive pressure) mode.

Escape

Any gas mask providing protection against organic vapors.
Any escape self-contained breathing apparatus.

(f) Fire and Safety

Employers shall familiarize themselves with the information contained in the Substance Technical Guidelines for vinyl toluene which is contained in Appendix B in order to ensure the safe handling and use of vinyl toluene.

- (1) Electrical - For the purposes of compliance with section 1910.309, locations classified as hazardous locations due to the presence of vinyl toluene shall be Class I Group D.
- (2) Portable fire extinguishers - For the purposes of compliance with section 1910.157, vinyl toluene is classified as a Class B fire hazard.
- (3) Powered industrial trucks - For the purposes of compliance with section 1910.178, locations classified as hazardous locations due to the presence of vinyl toluene shall be Class I Group D.
- (4) Combustible liquids - For the purposes of compliance with section 1910.106, liquid vinyl toluene is classified as a Class II combustible liquid. Spray finishing operations shall be performed in accordance with sections 1910.107 and 1910.94(c). Dip tank operations shall be performed in accordance with sections 1910.108 and 1910.94(d).
- (5) Sources of ignition - Sources of ignition such as smoking or open flames are prohibited where vinyl toluene is used, handled or stored in a manner so as to create a potential fire or explosion hazard.
- (6) Storage - Vinyl toluene shall be stored so as not to come in contact with oxidizing agents and catalysts for polymerization such as aluminum chloride, peroxide and strong acid. The monomer shall be checked at least weekly to determine inhibitor and polymer content if the material is being stored in excess of 30 days at 90 F.

-(g) Personal Protective Equipment

(1) Skin Contact

- (i) Employers shall provide, and require employees to use, impervious clothing, gloves, face shields (8 inch minimum) and other appropriate protective clothing necessary to

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

prevent repeated or prolonged skin contact to vinyl toluene. Face shields shall comply with section 1910.133(a)(6).

- (ii) Employers shall ensure that clothing contaminated with vinyl toluene is placed in closed containers. Employers shall provide for the cleaning or disposal of such clothing and if the clothing is to be laundered or otherwise cleaned, shall inform the person performing this operation of the hazardous properties of vinyl toluene.
- (iii) Employers shall ensure that non-impervious clothing which becomes wet with vinyl toluene be removed promptly and not reworn until the vinyl toluene is removed from the clothing.
- (iv) Employers shall ensure that clothing which becomes wet with vinyl toluene be removed immediately and not reworn until the vinyl toluene is removed from the clothing.

(2) Eye Contact

- (i) Employers shall provide, and require employees to use, splash-proof safety goggles (cup-cover type dust and splash safety goggles), which comply with section 1910.133(a)(6), where eye contact to liquid vinyl toluene may occur.

(h) Spills

- (1) Spills of vinyl toluene shall be cleaned up immediately after eliminating potential sources of ignition and utilizing available ventilation.
- (2) Liquid vinyl toluene may not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

(i) Sanitation

- (1) Employers shall ensure that employees whose skin becomes wet with vinyl toluene promptly wash or shower as necessary to remove any vinyl toluene from the skin.
- (2) Where skin contamination may occur and showers are required for adequate cleaning of the body, employers shall provide showers as described in section 1910.141(d)(3).
- (3) Employers shall ensure that employees who handle vinyl toluene wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

(j) Training and Information - Each employer who has employees exposed to vinyl toluene in excess of the action level, or employees who may have skin or eye contact with liquid vinyl toluene, or employees who work where accidental release, spill, fire, or explosion of vinyl toluene may occur, shall annually:

- (1) Substance Safety Data Sheet - Inform each employee of the information contained in the Substance Safety Data Sheet for vinyl toluene, which is contained in Appendix A; and

(2) Medical -

- (I) Advise employees as to the signs and symptoms of exposure to vinyl toluene.
- (II) Instruct the employees to advise the employer of the development of signs and symptoms of exposure to vinyl toluene which are listed in Appendix A.
- (III) Instruct the employees to inform the employer if they develop any of the medical conditions listed in (k)(2) of this section; and

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

(3) Procedures -

(I) Provide training to insure that employees understand the precautions of safe use, emergency procedures, and the correct use of protective equipment relative to vinyl toluene.

(II) The procedures required by (j)(1), (2), and (3)(I) shall be provided to employees at the expense of the employer during the employee's normal working hours.

(k) Medical Surveillance

(1) The employer shall provide medical procedures as required by paragraph (k). These procedures shall be provided at no cost to the employee.

(2) Preplacement Questionnaire - The employer shall obtain from each employee who will be exposed to liquid vinyl toluene, or airborne concentrations of vinyl toluene at or above the action level, a written statement as to whether such employee has a history of any of the following:

- (i) Kidney disease
- (ii) Liver disease
- (iii) Chronic lung disease
- (iv) Skin disease

(3) Preplacement Medical Examination - The employer shall provide a medical examination for an employee if the employee provides a history of any of the conditions named in paragraph (k)(2).

(4) Results of Preplacement Examination - The employer shall obtain a physician's written opinion based on the medical examination pursuant to paragraph (k)(3).

(5) Periodic Medical Examinations - The employer shall provide a medical examination for an employee if the employee advises the employer of the development of:

- (i) Any of the medical conditions listed in (k)(2),
- (ii) Signs and symptoms listed in Appendix A which the employee suspects may be caused by exposure to vinyl toluene.

(6) Results of Periodic Examinations - The employer shall obtain a physician's written opinion based on the medical examination pursuant to paragraph (k)(5).

(7) Exclusion or Removal from Exposure - No employee shall be exposed to vinyl toluene if such exposure could place the employee at increased risk of material impairment of his health.

(8) Emergency Procedures - The employer shall provide emergency and follow-up medical examinations and treatment for any employee injured through exposure to vinyl toluene.

(9) Informing the Physician - The employer shall provide to the examining physician the following information:

- (i) A copy of this regulation for vinyl toluene;
- (ii) A description of the employee's duties as they relate to his exposure to vinyl toluene;
- (iii) A description of any personal protective equipment required to be used;

(iv) The results of any employee's exposure measurement, if available;

(v) The employee's anticipated exposure level; and

(vi) Upon request of the physician, information from previous medical examination of the employee.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

(10) Physician's Written Opinion

(i) The physician's written opinion shall be a signed statement by the examining physician specifically stating:

(a) Whether the employee has any detected medical conditions which could be directly or indirectly aggravated by exposure to vinyl toluene or which could significantly interfere with the ability of the employee to follow recommended or required procedures for protecting himself from unusual or emergency exposure.

(b) Any recommended limitations upon the employee's exposure to vinyl toluene.

(c) The employee has been informed by the physician of any detected medical conditions which required further medical examination or treatment.

(ii) The written opinion shall not reveal medical information unrelated to exposure to vinyl toluene.

(11) Refusal to be Medically Examined - If an employee refuses any required medical examination, the employer shall inform the employee of the possible health consequences of such refusal and obtain a signed statement from the employee indicating that the employee understands the risks involved by refusing to be examined.

(1) Recordkeeping.

(1) Initial determination.

(i) The employer shall keep an accurate record of all initial determinations required to be made pursuant to paragraph (c)(1) of this section.

(ii) The record shall include the written determination and any supporting documentation as required in paragraph (c)(1) of this section.

(iii) This record shall be maintained for at least one year.

(2) Exposure measurements.

(i) The employer shall keep an accurate record of all measurements taken to determine employee exposure to vinyl toluene.

(ii) This record shall include:

(a) The date of measurement;

(b) A reference to the subparagraph of this regulation which required the measurement, if any;

(c) Operations involving exposure to vinyl toluene which are being monitored;

(d) Sampling and analytical methods used and evidence of their accuracy;

(e) Number, duration, and results of samples taken;

(f) Name, Social Security number, and exposure of the employee monitored.

(iii) This record shall be maintained for one year.

(3) Mechanical ventilation.

(i) When mechanical ventilation is used as an engineering control, the employer shall maintain a record of measurements demonstrating the effectiveness of such ventilation as required by paragraph (e)(1)(i) of this section.

(ii) This record shall include:

(a) Date of measurement;

(b) Type of measurement taken;

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

- (c) Result of measurement.
- (iii) This record shall be maintained for one year.
- (4) Training and information.
 - (i) The employer shall keep an accurate record of all employee training and advice required by paragraph (j) of this section.
 - (ii) The record shall include:
 - (a) Date of training;
 - (b) Name and Social Security number of employees trained;
 - (c) Substance of training provided.
 - (iii) This record shall be maintained for at least one year.
- (5) Medical records.
 - (i) The employer shall keep an accurate medical record for each employee.
 - (ii) The record shall include:
 - (a) Physician's written opinion;
 - (b) Preplacement questionnaire;
 - (c) Any employee medical complaints relative to exposure to vinyl toluene;
 - (d) A signed statement of any refusal to be examined;
 - (e) A copy of information provided to the physician pursuant to paragraph (k)(9) of this section.
 - (iii) This record shall be maintained for the duration of the employment of the affected employee.
- (6) Access to records.
 - (i) All records required to be maintained by this section shall be made available upon request to authorized representatives of the Assistant Secretary and the Director.
 - (ii) Employee exposure measurement records required to be maintained by this section shall be made available to employees and former employees and their designated representatives.
 - (iii) Employee medical records required to be maintained by this section shall be made available upon written request to a physician designated by the employer or former employee.
- (m) Observation of monitoring.
 - (1) Duty.

The employer shall give affected employees or their representatives an opportunity to observe any monitoring of employee exposure to vinyl toluene which is conducted pursuant to this section.
 - (2) Exercise of opportunity to observe monitoring.
 - (i) When observation of the monitoring of employee exposure to vinyl toluene requires entry into an area where the use of personal protective devices is required, the observer shall use such equipment and comply with all other applicable safety procedures.
 - (ii) Without interfering with the measurement, observers shall be entitled to:
 - (a) Receive an explanation of the measurement procedures;
 - (b) Visually observe all steps related to the measurement of exposure to vinyl toluene that are being performed at the place of exposure.
 - (c) Record the results obtained.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

- (n) Employee notification.
- (1) The employer shall notify in writing, within five work days, every employee who is found to be exposed to vinyl toluene above the permissible exposure. The employee shall also be notified of the level of his exposure and the corrective action being taken to reduce the exposure to at or below the permissible exposure.
- (2) Pursuant to paragraph (k) of this Section, when an employee is medically examined the employer shall provide the employee with a copy of the physician's written opinion.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

APPENDIX A

SUBSTANCE SAFETY DATA SHEET

I. SUBSTANCE IDENTIFICATION

SUBSTANCE: Vinyl toluene

PERMISSIBLE EXPOSURE: 100 parts of vinyl toluene vapor per million parts of air (ppm) or 480 milligrams of vinyl toluene vapor per cubic meter of air (mg/cu m).

APPEARANCE AND ODOR: Colorless liquid with a disagreeable odor.

II. HEALTH HAZARD DATA

- A. Ways in Which the Chemical Affects Your Body: Vinyl toluene can affect your body if you inhale it, swallow it, or if it comes in contact with your skin or eyes.
- B. Effects of Overexposure:
1. Short-Term Effects: Vinyl toluene may cause irritation of the nose, throat, eyes and skin. It may also cause drowsiness.
 2. Long-Term Effects: Repeated exposure may cause irritation of the skin.
 3. Reporting Signs and Symptoms: You should inform your employer if you develop any signs or symptoms associated with vinyl toluene exposure.

III. EMERGENCY FIRST AID PROCEDURES

- A. Eye Exposure: If vinyl toluene gets into your eyes, wash your eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention as soon as possible. Contact lenses should not be worn when working with this chemical.
- B. Skin Exposure: If vinyl toluene gets on your non-impervious clothing or skin remove and clean the contaminated clothing and flush the contaminated skin with water promptly. When there is skin irritation, get medical attention.
- C. Breathing: If you or any other person breathes in large amounts of vinyl toluene remove the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

- D. Swallowing: If vinyl toluene has been swallowed, do not cause vomiting. Get medical attention immediately.
- E. Rescue: Move affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty yourself. Understand your emergency rescue procedures and know the locations of the equipment before the need arises.
- IV. RESPIRATORS AND PROTECTIVE CLOTHING
- A. RESPIRATORS: Respirators are not the best way to control exposure to vinyl toluene. You can only be required to wear them for routine use if your employer is in the process of installing controls or other control measures prove inadequate. You may be required to wear respirators for non-routine activities or in emergencies. If respirators are worn, they must have a Mining Enforcement and Safety Administration (MESA)/National Institute for Occupational Safety and Health (NIOSH) approval label. (Older respirators may have a Bureau of Mines approval label.)
- If you can smell vinyl toluene while wearing a respirator, the respirator is not working correctly; go immediately to fresh air. If you experience difficulty breathing while wearing a respirator, tell your employer.
- B. PROTECTIVE CLOTHING: You must wear impervious clothing, gloves, face shields, and other appropriate protective clothing over any parts of your body that could repeatedly be exposed to vinyl toluene liquid.
- C. EYE PROTECTION: You must wear splash-proof safety goggles if it is possible that vinyl toluene may get into your eyes.
- V. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE
- Vinyl toluene is a combustible liquid and must be stored in tightly closed steel containers in a cool, well-ventilated area away from ignition sources, strong acids, oxidizing agents, peroxides, aluminum chloride, and polymerization catalysts. Smoking is prohibited in areas where vinyl toluene is used, handled or stored. If your non-impervious clothing becomes wet with vinyl toluene, you must promptly remove the clothing and not rewear it until the vinyl toluene has been removed. If your skin becomes wet with vinyl toluene, you must wash or shower promptly. You must wash your face before eating, smoking, or using toilet facilities. Fire extinguishers, where provided, must be readily available and you should know where they are and how to operate them. Ask your supervisor where vinyl toluene is used in your work area and for any additional plant safety rules.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

APPENDIX B

SUBSTANCE TECHNICAL GUIDELINES
VINYL TOLUENE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: Methylstyrene; tolylethylene; meta-, and para-vinyltoluene (mixed isomers)
2. Formula: $\text{CH}_3\text{C}_6\text{H}_4\text{CH}=\text{CH}_2$

B. Physical Data

1. Boiling point (760 mm Hg): 168 C (334 F)
2. Specific gravity (water=1): 0.92
3. Vapor density (air=1): 4.1
4. Melting point: -77 C (-106 F)
5. Vapor pressure at 20 C (68 F): 1.1 mm Hg
6. Solubility in water, % by weight at 20 C (68 F): 0.009
7. Evaporation rate (butyl acetate=1): less than 0.5
8. Appearance and odor: Colorless liquid with a strong disagreeable odor

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Flash point: 53 C (127 F) (closed cup)
2. Autoignition temperature: 495 C (923 F)
3. Flammable limits in air, % by volume: Lower: 0.8; Upper: 11
4. Extinguishing media: Dry chemical, carbon dioxide or foam.
5. Special fire-fighting procedures: Do not use solid stream of water, since stream will scatter and spread fire. Use water spray to keep containers cool. Large fires must be fought from a distance, or from a protected location.
6. Unusual fire and explosion hazards: vinyl toluene is a combustible liquid. Its vapors can form explosive mixtures in air at elevated temperatures. All ignition sources must be controlled when vinyl toluene is used, handled, and stored. vinyl toluene vapors are heavier than air; thus the vapors may travel along the ground and be ignited by open flames or sparks at locations remote from the site at which the vinyl toluene is handled.
7. For purposes of conforming to the requirements of 29 CFR 1910.106, vinyl toluene is classified as a Class II combustible liquid. At 2000 ppm, one fourth of the lower flammable limit, vinyl toluene is considered a potential fire and explosion hazard.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

8. For the purposes of complying with 29 CFR 1910.309, the classification of hazardous locations as described in Article 500 of the National Electrical Code for vinyl toluene shall be Class I, Group D.

B. Reactivity

1. Conditions contributing to instability: Vinyl toluene is stabilized by a polymerization inhibitor (10-50 ppm of tert-butylcatechol). If this is not present in adequate concentration, vinyl toluene can polymerize and explode the container.
2. Incompatibilities: Contact with oxidizing agents may cause fire and explosions. Also, catalysts for vinyl polymerization, such as peroxides, strong acids and aluminum chlorides must be avoided.
3. Hazardous Decomposition Products: Toxic gases and vapors (such as carbon monoxide) may be released in a fire involving vinyl toluene.
4. Special Precautions: none

III. SPILL AND LEAK PROCEDURES

- A. If vinyl toluene is spilled or leaked, the following steps should be taken:

1. Remove all ignition sources
2. Ventilate area of spill or leak
3. For small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood) and burn the paper. Large quantities, can be collected and atomized in a suitable combustion chamber. Combustion may be improved by mixing with a flammable liquid. Vinyl toluene may not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

- B. Persons not wearing protective equipment should be restricted from areas of spills or leaks until cleanup has been completed.

C. Waste Disposal Methods:

Vinyl toluene may be disposed of:

1. By absorbing it in vermiculite, dry sand, earth or a similar material and disposing in a sanitary land fill.
2. By atomizing in a suitable combustion chamber. Combustion may be improved by mixing with a more flammable liquid.

IV. MONITORING AND MEASUREMENT PROCEDURES

- a. EXPOSURE ABOVE THE ACTION LEVEL: Measurements taken for the purpose of determining employee exposure under this section are best taken in a fashion such that the average 8-hour exposure may be determined from a single sample or two (2) 4-hour samples. Short term interval samples (up to 30 minutes) may also be used to determine average exposure level if a minimum of five (5) measurements are taken in a random manner over the 8-hour work shift. Random sampling means that any portion of the work shift has the same chance of being sampled as any other. The arithmetic average of all such random equal duration samples taken on one (1) work shift is an estimate of an employee's average level of exposure for that work shift. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee). Sampling

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

and analyses may be performed by instruments such as detector tubes certified by NIOSH under 42 CFR Part 84, portable direct-reading instruments, gas and vapor adsorption tubes with subsequent chemical analyses, or dosimeters. The method of measurement must determine the concentration of vinyl toluene to plus or minus 35%.

- b. EXPOSURE ABOVE THE PERMISSIBLE EXPOSURE: The monitoring under this section should be essentially the same as described under paragraph IV. A. Laboratories performing chemical analyses should be accredited in Industrial Hygiene Chemistry by the American Industrial Hygiene Association (AIHA). The method of measurement must determine the concentration of vinyl toluene to plus or minus 25%. Methods meeting these accuracy requirements are available in the "NIOSH Monitoring Methods Manual".

V. MISCELLANEOUS PRECAUTIONS

- A. High exposures to vinyl toluene can occur when transferring the liquid from one container to another.
- B. Non-sparking tools must be used to open and close metal vinyl toluene containers which must then be effectively grounded and bonded prior to pouring.
- C. Store vinyl toluene in tightly closed containers in a cool, well-ventilated area away from ignition sources, strong acids, oxidizing agents, aluminum chloride and catalysts of vinyl polymerization.
- D. If storage has involved temperatures above 21 C (70 F) check inhibitor content weekly after 30 days and maintain at level specified by the manufacturer (10-50 ppm).
- E. Vinyltoluene vapors are not inhibited. They can polymerize and clog tank vents and flame arresters.
- F. Employers must advise employees of all plant areas and operations where exposure to vinyl toluene could occur.

VI. COMMON OPERATIONS

Some common operations in which exposure to vinyl toluene is likely to occur are during surface-spray coating, extrusion molding and injection molding.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. Route of Entry

Inhalation

II. Toxicology

The main toxic effect of vinyl toluene is irritation of the eyes and upper respiratory tract, and skin. With prolonged and repeated contact and absorption of high doses, there may be depression of the central nervous system.

III. Signs and Symptoms

Irritation of the eyes, skin and upper respiratory tract; as well as drowsiness at higher levels of exposure.

IV. Special Tests

None in common usage.

V. Treatment

None specific. Remove from exposure, give artificial resuscitation if indicated, and wash eyes and contaminated skin. Recovery is usually rapid and complete.

VI. Surveillance and Preventive Considerations

A. General

Very little has been reported on this compound; however, reported effects of vinyl toluene are caused by its irritant properties. It is important that the physician become familiar with plant operating conditions in which exposure to vinyl toluene occurs. Those with skin disease may not tolerate the wearing of protective clothing and those with chronic respiratory diseases may not tolerate the wearing of negative pressure respirators.

B. Preplacement

Routine medical histories and physical examinations are not required. However the employer must screen employees for history of certain medical conditions (listed below) which might place the employee at increased risk from vinyl toluene exposure. Only those giving a positive history of these conditions must be referred for further medical examinations.

1. Kidney disease -- Although vinyl toluene is not known as a kidney toxin, the importance of the organ in the elimination

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

of toxic substances justifies special consideration in those with possible impairment of renal function.

2. Chronic respiratory disease -- In persons with impaired pulmonary function, especially those with obstructive airway diseases, the breathing of vinyl toluene might cause exacerbation of symptoms due to its irritant properties or psychic reflex bronchospasm.
3. Liver disease -- Although vinyl toluene is not known as a liver toxin in humans, the importance of this organ in the biotransformation and detoxification of foreign substances should be considered before exposing persons with impaired liver function.
4. Skin disease -- Vinyl toluene is a defatting agent and can cause dermatitis on prolonged exposure. Persons with pre-existing skin disorders may be more susceptible to the effects of vinyl toluene.

C. Periodic Examinations

Routine periodic examinations are not required. However, if the employer becomes aware of an employee with the above listed conditions, he must refer such employee for further medical examination.

References

1. Wolf, M.A., et al.: "Toxicological Studies of Certain Alkylated Benzenes and Benzene". Archives of Industrial Health, 14:387-398, 1956.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

REFERENCES AND SOURCES
VINYL TOLUENE
1910.93

(f) Personal Protective Equipment, and, (h) Sanitation

Eyes: Grant, "Toxicology of the Eye"

"Vinyl Toluene," Dow Chemical Co.

Skin: "Vinyl Toluene," Dow Chemical Co.

Wolf et al., "Toxicological Studies of Certain Alkylated Benzenes and Benzene" Arch. Ind. Hth. 14 (4) 387-98 (1956)

Ingestion: Sax, "Dangerous Properties of Industrial Materials"

Fairhall, "Industrial Toxicology"

Browning, "Toxicity and Metabolism of Industrial Solvents"

Wolf et al., "Toxicological Studies of Certain Alkylated Benzenes and Benzene" Arch. Ind. Hth. 14 (4) 387-98 (1956)

COMMENTS

Eye - Classification: 2

Output statement numbers: 10

Exceptions: None

Interpreting the data of Smyth and Carpenter, Grant comments "vinyl toluene has been tested by application of a drop to rabbit eyes and was found to cause slight transient conjunctival irritation but no injury of the cornea." The Dow Chemical Company agrees. In the absence of any other information, it is concluded that vinyl toluene will only produce mild or moderate eye irritation when in contact with the eye and that a classification of 2 is appropriate.

Skin - Classification: 2

Output statement numbers: 2, 7b, 17g, 17i

Exceptions: 20a deleted

The Dow Chemical Company reports that upon a single short exposure, no irritation is likely but upon prolonged or repeated contact there may be slight to moderate irritation and possibly a minor burn. They note a low toxicity for skin absorption and give no LD50 value because skin tests indicated no absorption. According to Wolf et al., repeated cutaneous application of vinyl toluene to the skin of rabbits caused perceptible to moderate erythema and the development edema and superficial necrosis, resulting in a chapped appearance and exfoliation of large patches of skin. They also found the chemical caused blistering when confined.

Vinyl toluene is 0.009% soluble in water, has a flash point of 127.4 degrees F, and a vapor pressure of 1.1 mm Hg at 20 degrees.

A classification of 2 is concluded to be appropriate for the substance. Statement 20a is not used because the amounts of chemical towards which it is directed would have innocuous effects.

Ingestion - Classification: 0

Output statement numbers: None

Exceptions: None

Wolf et al. list an oral rat LD50 of 4.0 g/kg. According

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

to Sax, vinyl toluene is very similar to toluene in its toxicological properties. Browning notes that toluene exerts "a narcotic effect in 2 phases . . . a preliminary narcosis followed by a stage of excitement manifested by tremors, muscular cramps and behavioral disorders." She also reports that toluene does not cause any apparent injury to the hemapoietic system, such as that produced by benzene. Fairhall adds, toluene poisoning "causes headaches, dizziness, anorexia, palpitations, weakness and a lack of coordination."

Since vinyl toluene is of low acute toxicity, chronic feeding data are unavailable, and the similar compound, toluene, does not appear to have serious effects, it is concluded that ingestion of harmful quantities would not present a hazard in the industrial environment in the context of this standard.

RESPIRATOR TABLE DOCUMENTATION

SUBSTANCE: Vinyl toluene

D. O. L. STANDARD: 100 ppm

WARNING PROPERTIES:

Odor Threshold: No quantitative information is available concerning the odor threshold of vinyl toluene.

Irritation Levels: According to the ILO, vinyl toluene "gives rise to irritation of the nasal and conjunctival mucosae at 400 ppm and is detectable at 50 ppm."

Evaluation of Warning Properties: Since the ILO reports that vinyl toluene is detectable at a concentration below the permissible exposure limit, vinyl toluene is treated as a material with adequate warning properties. Gas sorbent respiratory equipment is permitted.

IDLH: 5000 ppm

Basis for IDLH Value: Since there are no acute inhalation toxicity data available upon which to base an IDLH concentration for vinyl toluene, the chosen IDLH (5000 ppm) has been based upon an analogy with styrene. Animals exposed to styrene at a concentration of 5000 ppm for one hour became unconscious.

Other Toxicological Information: In describing the toxicology of methyl styrene (vinyl toluene), Sax states that "from animal studies, it appears that immediate deaths occur from primary action on CNS whereas delayed deaths come about from pneumonia."

There are no acute inhalation toxicity data for vinyl toluene.

LFL: 8000 ppm

VAPOR PRESSURE AT 20 C: 1.1 mm Hg

SATURATED CONCENTRATION AT 20 C: 1450 ppm

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for VINYL TOLUENE

USE/EXPOSURE AND CONTROL DOCUMENT
VINYL TOLUENE

Use/Exposure	Principal Route of Entry	Currently Used Control Methods
1. Inhalation of vapor and skin contact with liquid during spray application of vinyl toluene polyester surface coatings	A,B	Local downdraft ventilation; personal protective equipment (gloves, goggles)
2. Inhalation of vapor during preparation of unsaturated polyester resins (developed as a substitute for styrene) and alkyd coatings	A	Local downdraft ventilation
3. Inhalation of vapor and skin contact with liquid during application of specialty paints and varnishes	A,B	Local exhaust ventilation; personal protective equipment (gloves, goggles, respiratory)
4. Inhalation of vapor during manufacture of thermoplastic moldings via extrusion, injection, stamping, or other processes	A	Local downdraft ventilation; general dilution ventilation

- A -- Inhalation
- B -- Skin contact resulting in localized irritation
- C -- Ingestion
- D -- Skin contact resulting in absorption and subsequent systemic poisoning

----- JES2 JOB STATISTICS -----

1,043 CARDS READ

0 SYSOUT PRINT RECORDS

0 SYSOUT PUNCH RECORDS

0.00 MINUTES EXECUTION TIME

