

NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND
SUPPORTING DOCUMENTATION FOR

*** P-TERT-BUTYLTOLUENE ***

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for P-TERT-BUTYLTOLUENE

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 P-TERT-BUTYLTOLUENE.

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.

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(a) DEFINITIONS

- (1) PERMISSIBLE EXPOSURE - "Permissible Exposure" means inhalation of p-tert-butyltoluene in concentrations not in excess of 10 parts per million (ppm) (60 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 p-tert-butyltoluene.

(b) EMPLOYEE INFORMATION - Each employer who has a workplace in which p-tert-butyltoluene 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 P-TERT-BUTYLTOLUENE - Inform affected employees of the quantity, location, and manner of use or storage of p-tert-butyltoluene.

(c) EXPOSURE MEASUREMENT

- (1) INITIAL DETERMINATION - Each employer who has a place of employment in which p-tert-butyltoluene is released into the workplace air shall determine if any employee may be exposed to airborne concentrations of p-tert-butyltoluene 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 p-tert-butyltoluene. 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 p-tert-butyltoluene;
 - (ii) Any measurements of airborne concentrations of p-tert-butyltoluene taken;
 - (iii) Any employee complaints of symptoms which may be attributable to exposure to p-tert-butyltoluene; 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 p-tert-butyltoluene 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 p-tert-butyltoluene 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 p-tert-butyltoluene 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.

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- (5) EXPOSURE ABOVE THE PERMISSIBLE EXPOSURE - If an employee exposure measurement reveals that an employee is exposed to airborne concentrations of p-tert-butyltoluene 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 p-tert-butyltoluene 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 p-tert-butyltoluene 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 p-tert-butyltoluene 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.

(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
 - (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

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- 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 p-tert-BUTYLTOLUENE

Condition	Permissible Respiratory Protection
Vapor Concentration	
Equal to or Less than 500 ppm	and organic vapor cartridge(s). A gas mask with a chin-style or front or back-mounted organic vapor canister. Any supplied-air respirator with a full facepiece. Any self-contained breathing apparatus with a full facepiece.
Equal to or Less than 1000 ppm	piece operated in pressure-demand (positive pressure) mode or with a full facepiece, hood, or helmet operated in continuous flow mode.
Greater than 1000 ppm or Entry & Escape from Unknown Concentrations	Self-contained breathing apparatus with a full facepiece mode. 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.

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

(f) Fire and Safety

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

- (1) Electrical - For the purposes of compliance with section 1910.309, locations classified as hazardous locations due to the presence of p-tert-butyltoluene shall be Class I Group D.
- (2) Portable fire extinguishers - For the purposes of compliance with section 1910.157, p-tert-butyltoluene 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 p-tert-butyltoluene shall be Class I Group D.
- (4) Combustible liquids - For the purposes of compliance with section 1910.106, liquid p-tert-butyltoluene is classified as a Class III A combustible liquid.
- (5) Sources of ignition - Sources of ignition such as smoking or open flames are prohibited where p-tert-butyltoluene is used, handled or stored in a manner so as to create a potential fire or explosion hazard.
- (6) Storage - p-tert-Butyltoluene shall be stored so as not to come in contact with strong oxidizing agents.

(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 prevent repeated or prolonged skin contact to p-tert-butyltoluene. Face shields shall comply with section 1910.133(a)(6).
- (ii) Employers shall ensure that clothing contaminated with p-tert-butyltoluene 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 p-tert-butyltoluene.
- (iii) Employers shall ensure that non-impervious clothing which becomes wet with p-tert-butyltoluene be removed promptly and not reworn until the p-tert-butyltoluene is removed from the clothing.
- (iv) Employers shall ensure that clothing which becomes wet with p-tert-butyltoluene be removed immediately and not reworn until the p-tert-butyltoluene 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

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safety goggles), which comply with section 1910.133(a)(6), where eye contact to liquid p-tert-butyltoluene may occur.

(h) Spills

- (1) Spills of p-tert-butyltoluene shall be cleaned up immediately after eliminating potential sources of ignition and utilizing available ventilation.
- (2) Liquid p-tert-butyltoluene 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 p-tert-butyltoluene promptly wash or shower as necessary to remove any p-tert-butyltoluene 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 p-tert-butyltoluene 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 p-tert-butyltoluene in excess of the action level, or employees who may have skin or eye contact with liquid p-tert-butyltoluene, or employees who work where accidental release, spill, fire, or explosion of p-tert-butyltoluene may occur, shall annually:

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

(2) Medical -

- (I) Advise employees as to the signs and symptoms of exposure to p-tert-butyltoluene.
- (II) Instruct the employees to advise the employer of the development of signs and symptoms of exposure to p-tert-butyltoluene 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

(3) Procedures -

- (I) Provide training to ensure that employees understand the precautions of safe use, emergency procedures, and the correct use of protective equipment relative to p-tert-butyltoluene.
- (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 in paragraph (k). These procedures shall be provided at no cost to the employee.

(2) Preplacement Examination - The employer shall make available to each employee who is to be exposed to p-tert-butyltoluene in excess of the action level a medical examination which must include as a minimum the following:

- (i) A medical history and physical examination with emphasis on the blood, heart, and central nervous system.

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(ii) A blood count to include at least a hemoglobin, hematocrit, white and red cell count and a differential smear.

(iii) An electrocardiogram

(3) The employer shall obtain from the physician, as a record of the examination, the following information:

(i) The physician's written opinion stating whether or not the employee has any detected medical conditions which would place him at increased risk from exposure to p-tert-butyltoluene.

(ii) A recording of the complete blood count.

(iii) A recording of the electrocardiogram.

(4) Periodic Examinations - The employer shall make available to each employee, exposed to p-tert-butyltoluene in excess of the action level at 6 months from the date of the employee's first exposure, and at every 6 months of exposure thereafter, a medical examination which must include the following:

(i) A medical history and physical examination referable to the hemopoietic system.

(ii) A complete blood count (see section (2)(ii)).

(iii) An electrocardiogram.

(5) Results of Periodic Examinations - The employer shall obtain from the physician, as a record of the periodic examination, the following information:

(i) The physician's written opinion stating whether or not the employee has any detected medical conditions which would place him at increased risk from further exposure to p-tert-butyltoluene.

(ii) A recording of the complete blood count.

(iii) A recording of the electrocardiogram.

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

(7) Emergency Procedures - The employer shall provide emergency and follow-up medical examinations and treatment for any employee injured through exposure to p-tert-butyltoluene.

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

(i) A copy of this regulation for p-tert-butyltoluene;

(ii) A description of the employee's duties as they relate to his exposure to p-tert-butyltoluene;

(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.

(9) 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 p-tert-butyltoluene or which could significantly interfere with the ability of the

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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 p-tert-butyltoluene.

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

(ii) The written opinion shall not reveal medical information unrelated to exposure to p-tert-butyltoluene.

(10) Alternative Medical Examinations - If the examining physician chooses to use alternative medical examinations to those specified in sections (2) and (4), the employer may accept such alternative medical surveillance examinations as meeting the requirements of this part provided that the employer:

(i) Obtains a statement from the examining physician setting forth the alternative medical examinations and the rationale for substitution and evidence that they will be equally effective.

(ii) Informs each exposed worker of the fact that alternative medical examinations to those required in section (2) or (4) above are to be made available.

(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 p-tert-butyltoluene.

(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 p-tert-butyltoluene which is 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.

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- (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;
 - (c) Result of measurement.
 - (iii) This record shall be maintained for one year.
- (4) Annual training.
- (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 employee 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) Results of tests required in Section (k)(3) and (k)(5) of this section;
 - (b) Physician's written opinion;
 - (c) Any employee medical complaints relative to exposure to p-tert-butyltoluene;
 - (d) A signed statement of any refusal to be examined;
 - (e) A copy of information provided to the physician pursuant to paragraph (k)(8) (ii) through (vi) 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 employee 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 employee 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 p-tert-butyltoluene which is conducted pursuant to this section.
 - (2) Exercise of opportunity to observe monitoring.
 - (i) When observation of the monitoring of employee exposure to p-tert-butyltoluene 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.

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(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 p-tert-butyltoluene that are being performed at the place of exposure.
- (c) Record the results obtained.

(n) Employee notification.

- (1) The employer shall notify in writing, within five work days, every employee who is found to be exposed to p-tert-butyltoluene above the permissible exposure. The employee shall also be notified of the level of his exposure and 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.

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APPENDIX A

SUBSTANCE SAFETY DATA SHEET

I. SUBSTANCE IDENTIFICATION

SUBSTANCE: p-tert-butyltoluene

PERMISSIBLE EXPOSURE: 10 parts of p-tert-butyltoluene vapor per million parts of air (ppm) or 60 milligrams of p-tert-butyltoluene vapor per cubic meter of air (mg/cu m)

APPEARANCE AND ODOR: Colorless liquid with a gasoline-like odor.

II. HEALTH HAZARD DATA

A. Ways in Which the Chemical Affects Your Body: p-tertbutyltoluene 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: p-tert-butyltoluene may cause irritation of the eyes, nose, throat and skin; nausea, headache and weakness.
2. Long Term Effects: p-tert-butyltoluene may cause heart changes, blood changes, and skin rash.
3. Reporting Signs and Symptoms: You should inform your employer if you develop any signs or symptoms associated with p-tert-butyltoluene exposure.

III. EMERGENCY FIRST AID PROCEDURES

A. Eye Exposure: If p-tert-butyltoluene 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 p-tert-butyltoluene 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.

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- C. Breathing: If you or any other person breathes in large amounts of p-tert-butyltoluene 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.
- D. Swallowing: If p-tert-butyltoluene 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 p-tert-butyltoluene. 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 p-tert-butyltoluene 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 shield, and other appropriate protective clothing over any parts of your body that could repeatedly be exposed to p-tert-butyltoluene liquid.
- C. EYE PROTECTION: You must wear splash-proof safety goggles if it is possible that p-tert-butyltoluene may get into your eyes.

V. PRECAUTIONS FOR SAFE USE, HANDLING, AND STORAGE

p-tert-Butyltoluene is a combustible liquid and must be stored in tightly closed containers, in a cool well-ventilated area, away from ignition sources. You must not smoke in areas where p-tert-butyltoluene is stored, handled, or used. Metal p-tert-butyltoluene storage containers must be grounded and bonded when transferring liquids and must be opened and closed with non-sparking tools. If your non-impervious clothing becomes wet with p-tert-butyltoluene, you must promptly remove the clothing and not wear it again until the p-tert-butyltoluene has been removed. If your skin becomes wet with p-tert-butyltoluene, you must wash or shower promptly. Fire extinguishers, where provided, must be readily available and you should know where they are and how to operate them. Ask your supervisor where p-tert-butyltoluene is used in your work area and for any additional plant safety rules.

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APPENDIX B

SUBSTANCE TECHNICAL GUIDELINES
P-TERT-BUTYLTOLUENE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: 1-methyl-4-tert-butylbenzene
2. Formula: P-CH3C6H4C4H9

B. Physical Data

1. Boiling point (760 mm Hg): 193 C (380 F)
2. Specific gravity (Water): 0.86
3. Vapor density (air=1): 5.1
4. Melting point: -52.5 C (-62 F)
5. Vapor pressure at 20 C (68 F): less than 1 mm Hg
6. Solubility in water, % by weight at 20 C (68 F): Insoluble
7. Evaporation rate (butyl acetate=1): very low
8. Appearance and odor: Colorless liquid with aromatic odor somewhat like gasoline.

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Flash point: 68 C (155 F) (open cup)
2. Autoignition temperature: data not available
3. Flammable limits in air, % by volume: data not available
4. Extinguishing media: Foam, carbon dioxide, dry chemical
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.
6. Unusual fire and explosion hazards: p-tert-butyltoluene is a combustible liquid. Its vapors can form explosive mixtures in air at elevated temperatures. All ignition sources must be controlled when p-tert-butyltoluene is used, handled, and stored. p-tert-butyltoluene 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 p-tert-butyltoluene is handled.
7. For purposes of conforming to the requirements of 29 CFR 1910.106, p-tert-butyltoluene is classified as a Class IIIA combustible liquid.
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 p-tert-butyltoluene shall be Class I, Group D.

B. Reactivity

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1. Conditions contributing to instability: heat
2. Incompatibilities: Contact with oxidizing agents may cause fire and explosions.
3. Hazardous Decomposition Products: Toxic gases and vapors (such as carbon monoxide) may be released in a fire involving p-tert-butyltoluene.
4. Special Precautions: none

III. SPILL AND LEAK PROCEDURES

- A. If p-tert-butyltoluene 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 more flammable liquid. Liquid p-tert-butyl 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:

p-tert-Butyltoluene 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 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 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 p-tert-butyltoluene 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

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must determine the concentration of p-tert-butyltoluene 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 p-tert-butyltoluene can occur when transferring the liquid from one container to another.
- B. Non-sparking tools must be used to open and close metal p-tert-butyltoluene containers which must then be effectively grounded and bonded prior to pouring.
- C. Store p-tert-butyltoluene in tightly closed containers in a cool, well-ventilated area.
- D. Employers must advise employees of all plant areas and operations where exposure to p-tert-butyltoluene could occur.

VI. COMMON OPERATIONS

Some common operations in which exposure to p-tert-butyltoluene is likely to occur are where it is synthesized from toluene and isobutylene, where it is purified and packaged, and where it is used as a solvent, oil additive, perfume fixative and intermediate in the synthesis of pharmaceuticals and resins.

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APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. Route of Entry

Inhalation

II. Toxicology

The main toxic effects of p-tert-butyltoluene are irritation of the skin and respiratory tract. Absorbed p-tert-butyltoluene may depress the central nervous system and the bone marrow. In some exposed employees a cardiovascular syndrome characterized by decreased blood pressure, increased pulse rate, and abnormal response to the Master's exercise test has been observed.

III. Signs and Symptoms

Irritation of the eyes and skin, dryness of the nose and throat, headache, decreased blood pressure, tachycardia and abnormal response to tests of cardiovascular stress; central nervous system depression and possible hematopoietic depression.

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

p-Tert-butyltoluene is reported to be associated with toxic effects on various organs, although usual occupational exposures have produced only mild symptoms and signs. It is important that the physician becomes familiar with plant operating conditions in which exposure to p-tert-butyltoluene occurs. Those with skin disease may not tolerate the wearing of protective clothing and those with chronic respiratory disease may not tolerate the wearing of negative pressure respirators.

B. Preplacement

The following medical procedures must be made available to each employee who is exposed to p-tert-butyltoluene.

1. A complete history and physical examination -- The purpose is to detect pre-existing conditions that might place the

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exposed person at increased risk, and to establish a baseline for future health monitoring. Examination of the cardiovascular and the central nervous systems should be stressed. The skin should be examined for evidence of chronic disorders.

2. An electrocardiogram -- This compound has been observed to cause an unusual cardiovascular syndrome in some workmen after occupational exposure. This consisted of decreased blood pressure, increased pulse rate, and failure to respond to the Master's test of cardiac fitness in a satisfactory manner.
3. Complete blood count -- This compound has been shown to cause depression of the bone marrow in rats exposed repeatedly to vapor in concentrations of up to 30 ppm. A complete blood count must be performed prior to exposure, including a differential count of a stained blood smear, as well as hemoglobin, hematocrit, and clotting time determinations.

C. Periodic Examinations

The above medical examinations are to be repeated on an annual basis.

References

1. Hine, Charles H., et al.: "Toxicological Studies on p-tert-butyltoluene." Archives of Industrial Hygiene and Occupational Health, 9:227-243, 1954.
2. Browning, Ethel: Toxicology and Metabolism of Industrial Solvents, Elsevier Publishing Company, New York, 1965, pp. 107.

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REFERENCES AND SOURCES
P-TERT BUTYLTOLUENE

1910.93

- (f) Personal Protective Equipment, and, (h) Sanitation
Eye: Hine et al., "Toxicological Studies on p-tertiary-Butyltoluene"
Ind. Hyg. and Occ. Med. 9, 227-44 (1954)
Skin: Documentation of Threshold Limit Values
Hine et al., "Toxicological Studies on p-tertiary-Butyltoluene"
Ind. Hyg. and Occ. Med. 9, 227-44 (1954)
Ingestion: Browning, "Toxicology and Metabolism of Industrial Solvents"
Fairhall, "Industrial Toxicology"
Sax, "Dangerous Properties of Industrial Materials"
Hine et al., "Toxicological Studies on p-tertiary Butyltoluene"
Ind. Hyg. and Occ. Med. 9, 227-44 (1954)

COMMENTS

Eye - Classification: 2

Output statement numbers: 10

Exceptions: None

Hine et al. report "the most consistent sign of eye irritation was a moderate to heavy discharge from the treated eyes." They add, "a slight chemosis was evident at the twenty-four hour point, but had disappeared before the forty-eight hour check." They also note, "according to the method of Carpenter and Smyth, the grade of irritation was less than 1." This indicates "only a moderate irritation of the conjunctiva." Carpenter and Smyth's grade of 1 indicates that 0.5 ml of the undiluted chemical produces no more than iritis with slight internal congestion or necrosis on less than 5% of the cornea. A classification of 2 is concluded to be appropriate.

Skin - Classification: 2

Output statement numbers: 2, 7b, 16g, 16i

Exceptions: See below

According to the Document of Threshold Limit Values, "p-tert-butyltoluene is practically non-toxic by skin exposure." Hine et al. report that "p-tert-butyltoluene was found to be only a mild rubefacient." They add, "erythema was more pronounced in the intact than in the scarified areas and in only one of six animals was there evidence of edema at the site of application." They conclude, "apparently the compound will present no hazard from skin absorption or contact." This latter comment involving skin absorption is supported by data which showed "None of 12 rabbits receiving up to 10.7 ml per kilogram of TBT showed evidence of intoxication, but at 15.5 and 22.8 ml per kilogram five of eight animals showed evidence of severe alterations in physiology and subsequently died ... The LD50, as calculated by the method of Thompson, was 19.6 (13.8 to 27.8) ml per kilogram."

Liquid p-tert-butyltoluene is insoluble in water, has a flash point of 154.4 degrees F, and a vapor pressure less than 1 mm Hg.

A classification of 2 is concluded to be appropriate. Despite its low vapor pressure, its acute effects are considered too innocuous to require statements 17g and 17i instead of

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16g and 16i.

Ingestion - Classification: 2

Output statement numbers: 20a

Exceptions: None

Browning states that "p-tert-butyltoluene is predominantly a nerve poison with a potent injurious effect on the central nervous system." She continues, "injury to the central nervous system is shown by paralysis of both a spastic and a flaccid type, recurrent tremors, convulsions and moderate anaesthesia preceding death." Following administration, Hine et al. note "at first stimulation followed shortly by ataxia, confusion, marked depression and dyspnea, not severe until the terminal stages." They add, "general paresis is followed by recovery ... or respiratory depression is accompanied by fibrillation and abnormal posture usually ending in death." They list a LD50 of 1.8 plus or minus 0.14 ml/kg and a mouse LD50 of 0.9 plus or minus 0.06 ml/kg. "Changes in the liver due to fatty infiltration ... and fine granular changes and moderate fatty deposits in the tubular epithelium of the kidneys" were also noted. Fairhall lists an oral rat LD50 of 1543 mg/kg. Sax lists the acute and chronic effects of ingestion as a severe hazard. A classification of 2 is concluded to be sufficient to prevent ingestion of harmful amounts.

RESPIRATOR TABLE DOCUMENTATION

SUBSTANCE: p-tert-Butyltoluene

D. O. L. STANDARD: 10 ppm

WARNING PROPERTIES:

Odor Threshold: Patty reports that "olfactory recognition of (p-tert-butyltoluene) is immediate at concentrations of 5 ppm.

Eye Irritation Level: The ILO states that "slight conjunctival irritation occurs after exposure to 5-8 ppm."

Other Information: Sax states that inhalation of the vapors causes irritation of the lungs.

Evaluation of Warning Properties: Through its odor and irritant effects p-tert-butyltoluene can be detected at concentrations below the permissible exposure limit. p-tert-Butyltoluene is a material with good warning properties. Gas sorbent respiratory equipment is permitted.

IDLH: 1000 ppm

Basis for IDLH Value: This IDLH is based upon the female rat 1-hour LC50 of 1000 ppm p-tert-butyltoluene reported in Patty.

Other Toxicological Information: According to Patty, "the LC50 values for female rats following single exposures ranged from 165 ppm after 8 hours of exposure to 934 ppm for a 1-hour exposure. The LC50 for the 4-hour exposure was 248 ppm for female rats and mice. Rats exposed to 1500 ppm showed signs of almost immediate respiratory distress with extreme dyspnea. With the exception of a slight dyspnea, there was no evidence of intolerance in rabbits exposed to the vapors of 1000 ppm of p-tert-butyltoluene."

According to Sax, "inhalation of vapors (of p-tert-butyltoluene) causes irritation of lungs and depression of CNS. Prolonged exposure may result in damage to liver and kidney."

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LFL: Data not available

VAPOR PRESSURE AT 20 C: less than 1 mm Hg

SATURATED CONCENTRATION AT 20 C: less than 1316 ppm

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USE/EXPOSURE AND CONTROL DOCUMENT
P-TERT-BUTYLTOLUENE

Use/Exposure	Principal Route of Entry	Currently Used Control Methods
1. Inhalation of vapor and skin contact with liquid during manufacture of p-tert-butyltoluene	A,B	Local exhaust ventilation; personal protective equipment (gloves, aprons)
2. Inhalation of vapor and skin contact with liquid during preparation and use of resins dissolved in p-tert-butyltoluene	A,B	Local exhaust ventilation; personal protective equipment (gloves, aprons)
3. Inhalation of vapor and skin contact with liquid during use as a primary intermediate in chemical industry	A,B	Local exhaust ventilation; personal protective equipment (gloves, aprons)
4. Inhalation of vapor and contact with liquid during use as a primary intermediate in pharmaceutical industry	A,B	Local exhaust ventilation; personal protective equipment (gloves, aprons)

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

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

1,069 CARDS READ

0 SYSOUT PRINT RECORDS

0 SYSOUT PUNCH RECORDS

0.00 MINUTES EXECUTION TIME

[illegible]