

OCCUPATIONAL SAFETY AND HEALTH GUIDELINE FOR o-CHLOROTOLUENE

INTRODUCTION

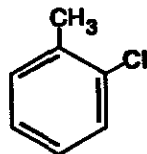
This guideline summarizes pertinent information about o-chlorotoluene for workers and employers as well as for physicians, industrial hygienists, and other occupational safety and health professionals who may need such information to conduct effective occupational safety and health programs. Recommendations may be superseded by new developments in these fields; readers are therefore advised to regard these recommendations as general guidelines and to determine periodically whether new information is available.

SUBSTANCE IDENTIFICATION

• Formula



• Structure



• Synonyms

2-Chloro-1-methylbenzene; 2-chlorotoluene;
2-methylchlorobenzene; 1-methyl-2-chlorobenzene;
o-tolyl chloride; Halso 99

• Identifiers

1. CAS No.: 95-49-8
2. RTECS No.: XS9000000
3. DOT UN: 2238 27
4. DOT label: Flammable liquid

• Appearance and odor

o-Chlorotoluene is a colorless liquid. The odor threshold for o-chlorotoluene is 0.32 part per million (ppm) parts of air.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 126.59
2. Boiling point (760 mm Hg): 159°C (318.2°F)
3. Specific gravity (water = 1): 1.083 at 20°C (68°F)
4. Vapor density (air = 1 at boiling point of o-chlorotoluene): 4.37
5. Melting point: -35.1°C (-31.18°F)
6. Vapor pressure at 43.2°C (109.8°F): 10 mm Hg

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health
Education and Information Division

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

7. Solubility: Slightly soluble in water; freely soluble in alcohol, acetone, ether, benzene, carbon tetrachloride, and chloroform

8. Evaporation rate: Data not available

Reactivity

1. Conditions contributing to instability: Heat, sparks, and open flame

2. Incompatibilities: Contact of o-chlorotoluene with oxidizing agents may cause fires or explosions.

3. Hazardous decomposition products: Toxic gases (such as chlorine) may be released in a fire involving o-chlorotoluene.

4. Special precautions: None reported

Flammability

The National Fire Protection Association has assigned a flammability rating of 2 (moderate fire hazard) to o-chlorotoluene (unspecified isomer, mixture, or concentration).

1. Flash point: 52°C (126°F) (open cup)

2. Autoignition temperature: Data not available

3. Flammable limits in air: Data not available

4. Extinguishant: Use dry chemical, CO₂, water spray, or standard foam to fight fires involving o-chlorotoluene.

Fires involving o-chlorotoluene should be fought upwind from the maximum distance possible. Isolate the hazard area and deny access to unnecessary personnel. Emergency personnel should stay out of low areas and ventilate closed spaces before entering. Vapor explosion and poison hazards may occur indoors, outdoors, or in sewers. Vapors may travel to a source of ignition and flash back. Containers of o-chlorotoluene may explode in the heat of the fire and should be moved from the fire area if it is possible to do so safely. If this is not possible, cool containers from the sides with water until well after the fire is out. Stay away from the ends of containers. Personnel should withdraw immediately if they hear a rising sound from a venting safety device or if a container becomes discolored as a result of fire. Dikes

should be used to contain fire-control water for later disposal. If a tank car or truck is involved in a fire, personnel should isolate an area of a half mile in all directions. Firefighters should wear a full set of protective clothing and self-contained breathing apparatus when fighting fires involving o-chlorotoluene. Structural firefighters' protective clothing may provide limited protection against fires involving o-chlorotoluene.

EXPOSURE LIMITS

• OSHA PEL

The Occupational Safety and Health Administration (OSHA) has not promulgated a permissible exposure limit (PEL) for o-chlorotoluene [29 CFR 1910.1000, Table Z-1].

• NIOSH REL

The National Institute for Occupational Safety and Health (NIOSH) has established a recommended exposure limit (REL) as 50 ppm (250 mg/m³) as a TWA for up to a 10-hr workday and a 40-hr workweek and 75 ppm (375 mg/m³) as a short-term exposure limit (STEL). A STEL is a 15-min TWA exposure that should not be exceeded at any time during a workday [NIOSH 1992].

• ACGIH TLV

The American Conference of Governmental Industrial Hygienists (ACGIH) has assigned o-chlorotoluene a threshold limit value (TLV) of 50 ppm (259 mg/m³) as a TWA for a normal 8-hr workday and a 40-hr workweek [ACGIH 1993].

• Rationale for limits

The NIOSH limit is based on the risk of moderate skin and eye irritation. The ACGIH limit is based on the risk of eye and skin irritation and systemic poisoning associated with exposure to o-chlorotoluene.

HEALTH HAZARD INFORMATION

• Routes of exposure

Exposure to o-chlorotoluene can occur through inhalation, ingestion, eye or skin contact, and percutaneous absorption.

Summary of toxicology

1. *Effects on Animals:* In animals, o-chlorotoluene is irritating to the eyes and skin and, at high doses, this substance affects the central nervous system. A 24-hr patch test with o-chlorotoluene showed moderate skin irritation on both abraded and intact rabbit skin [ACGIH 1991]. Undiluted liquid o-chlorotoluene applied to the skin of guinea pigs under an occlusive dressing in doses of 1 ml/kg or 10 ml/kg for a 24-hr period caused moderately severe local irritation and evidence of skin absorption [ACGIH 1991]. One drop of undiluted o-chlorotoluene instilled into the eye of a rabbit resulted in moderate conjunctival erythema; the cornea was opaque 24 hr after instillation but appeared normal 2 weeks later [ACGIH 1991]. The oral LD₅₀ in rats is 5,700 mg/kg, and three of 20 rats died after inhaling approximately 2,400 ppm [EPA 1989]. Rats exposed by inhalation for 6 hr to a 4,000-ppm concentration of o-chlorotoluene lost coordination in 1.5 hr, became prostrate after 1.75 hr, and showed tremors after 2 hr of exposure; marked vasodilation also developed in these animals. All three rats survived, however, and had gained weight (averaging 33 grams) 2 weeks later. Mice, rats, and guinea pigs exposed at a chamber concentration of 4,400 ppm exhibited the following: gasping, ataxia, and convulsions in mice within 30 min after exposure, and gasping, hyperpnea, ataxia, and convulsions in rats and guinea pigs in 45 min. All animals were comatose in 60 min. All mice and rats died as did 7 of 10 guinea pigs. Two guinea pigs were alive 2 week postexposure [ACGIH 1991]. Three rats exposed to 14,000 ppm o-chlorotoluene survived but showed loss of coordination, vasodilation, labored respiration, and narcosis. Of three rats exposed to 175,000 ppm, two were severely incapacitated while the other died. The two that survived were gaining weight 2 weeks later [ACGIH 1991].

2. *Effects on Humans:* There are no reports of the effects of exposure to o-chlorotoluene in humans.

Signs and symptoms of exposure

1. *Acute exposure:* Based on effects seen in animals, acute overexposure to o-chlorotoluene may cause dizziness; loss of coordination; tremors; difficult

breathing; redness, inflammation, and tearing of the eyes; and redness and inflammation of the skin.

2. *Chronic exposure:* No signs or symptoms of continued low-level exposure to o-chlorotoluene have been reported.

Emergency procedures

WARNING!

Transport victims immediately to emergency medical facility!

Keep unconscious victims warm and on their sides to avoid choking if vomiting occurs. *Immediately* initiate the following emergency procedures, continuing them as appropriate en route to the emergency medical facility:

1. *Eye exposure:* Tissue destruction and blindness may result from exposure to concentrated solutions, vapors, mists, or aerosols of o-chlorotoluene! *Immediately but gently* flush the eyes with large amounts of water for at least 15 min, occasionally lifting the upper and lower eyelids.
2. *Skin exposure:* Severe burns, skin corrosion, and absorption of toxic amounts may result! *Immediately* remove all contaminated clothing! *Immediately, continuously, and gently* wash skin for at least 15 min. Use soap and water if skin is intact; use only water if skin is not intact.
3. *Inhalation exposure:* Move the victim to fresh air *immediately*. Have the victim blow his or her nose or use a soft tissue to remove particulates or residues from the nostrils.

If the victim is not breathing, clean any chemical contamination from the victim's lips and perform cardiopulmonary resuscitation (CPR); if breathing is difficult, give oxygen.

4. *Ingestion exposure:* Take the following steps if o-chlorotoluene or any material containing it is ingested:

—Do *not* induce vomiting.

—Have the victim rinse the contaminated mouth cavity several times with a fluid such as water. Immediately after rinsing, have the victim drink one cup (8 oz) of fluid and *no more*.

—Do *not* permit the victim to drink milk or carbonated beverages!

—Do *not* permit the victim to drink any fluid if more than 60 min have passed since initial ingestion.

NOTE: These instructions must be followed exactly. Drinking a carbonated beverage or more than one cup of fluid could create enough pressure to perforate already damaged stomach tissue. The tissue-coating action of milk may impede medical assessment of tissue damage. Ingestion of any fluid more than 60 min after initial exposure could further weaken damaged tissue and result in perforation.

5. *Rescue:* Remove an incapacitated worker from further exposure and implement appropriate emergency procedures (e.g., those listed on the material safety data sheet required by OSHA's hazard communication standard [29 CFR 1910.1200]). All workers should be familiar with emergency procedures and the location and proper use of emergency equipment.

EXPOSURE SOURCES AND CONTROL METHODS

The following operations may involve o-chlorotoluene and may result in worker exposures to this substance:

—Use as a solvent and as an intermediate in the production of organic chemicals, pharmaceuticals, synthetic rubber compounds, and dyes

—Use as an intermediate in the production of herbicides

The following methods are effective in controlling worker exposures to o-chlorotoluene, depending on the feasibility of implementation:

—Process enclosure

—Local exhaust ventilation

—General dilution ventilation

—Personal protective equipment

Good sources of information about control methods are as follows:

1. ACGIH [1992]. *Industrial ventilation—a manual of recommended practice*. 21st ed. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.
2. Burton DJ [1986]. *Industrial ventilation—a self study companion*. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.
3. Alden JL, Kane JM [1982]. *Design of industrial ventilation systems*. New York, NY: Industrial Press, Inc.
4. Wadden RA, Scheff PA [1987]. *Engineering design for control of workplace hazards*. New York, NY: McGraw-Hill.
5. Plog BA [1988]. *Fundamentals of industrial hygiene*. Chicago, IL: National Safety Council.

MEDICAL MONITORING

Workers who may be exposed to chemical hazards should be monitored in a systematic program of medical surveillance that is intended to prevent occupational injury and disease. The program should include education of employers and workers about work-related hazards, early detection of adverse health effects, and referral of workers for diagnosis and treatment. The occurrence of disease or other work-related adverse health effects should prompt immediate evaluation of primary preventive measures (e.g., industrial hygiene monitoring, engineering controls, and personal protective equipment). A medical monitoring program is intended to supplement, not replace, such measures. To place workers effectively and to detect and control work-related health effects, medical evaluations should be performed (1) before job placement, (2) periodically during the term of employment, and (3) at the time of job transfer or termination.

• Preplacement medical evaluation

Before a worker is placed in a job with a potential for exposure to o-chlorotoluene, the licensed health care professional should evaluate and document the worker's baseline health status with thorough medical, environmental, and occupational histories, a physical examination, and physiologic and laboratory tests appropriate for the anticipated occupational risks. These should concentrate on the function and integrity of the eyes, skin, and central nervous system.

A preplacement medical evaluation is recommended to detect and assess medical conditions that may be aggravated or may result in increased risk when a worker is exposed to o-chlorotoluene at or below the prescribed exposure limit. The licensed health care professional should consider the probable frequency, intensity, and duration of exposure as well as the nature and degree of any applicable medical condition. Such conditions (which should not be regarded as absolute contraindications to job placement) include a history and other findings consistent with diseases of the eyes, skin, or central nervous system.

- **Periodic medical examinations and biological monitoring**

Occupational health interviews and physical examinations should be performed at regular intervals during the employment period, as mandated by any applicable Federal, State, or local standard. Where no standard exists and the hazard is minimal, evaluations should be conducted every 3 to 5 years or as frequently as recommended by an experienced occupational health physician. Additional examinations may be necessary if a worker develops symptoms attributable to o-chlorotoluene exposure. The interviews, examinations, and medical screening tests should focus on identifying the adverse effects of o-chlorotoluene on the eyes, skin, or central nervous system. Current health status should be compared with the baseline health status of the individual worker or with expected values for a suitable reference population.

Biological monitoring involves sampling and analyzing body tissues or fluids to provide an index of exposure to a toxic substance or metabolite. No biological monitoring test acceptable for routine use has yet been developed for o-chlorotoluene.

- **Medical examinations recommended at the time of job transfer or termination**

The medical, environmental, and occupational history interviews, the physical examination, and selected physiologic or laboratory tests that were conducted at the time of placement should be repeated at the time of job transfer or termination. Any changes in the worker's health status should be compared with those expected for a suitable reference population.

WORKPLACE MONITORING AND MEASUREMENT

A worker's exposure to airborne o-chlorotoluene is determined by using a charcoal tube (100/150-mg sections, 20/40 mesh). Samples are collected at a recommended flow rate of 0.2 liter/min until a recommended air volume of 20 liters is collected. Analysis is conducted by gas chromatography using a flame ionization detector. This method is an OSHA modification of NIOSH Method 1003, *NIOSH Manual of Analytical Methods* [NIOSH 1984].

PERSONAL HYGIENE

If o-chlorotoluene contacts the skin, workers should flush the affected areas immediately with plenty of water for 15 min, and then wash with soap and water.

Clothing contaminated with o-chlorotoluene should be removed immediately, and provisions should be made for safely removing this chemical from these articles. Persons laundering the clothes should be informed of the hazardous properties of o-chlorotoluene, particularly its potential to be absorbed through the skin in toxic amounts.

A worker who handles o-chlorotoluene should thoroughly wash hands, forearms, and face with soap and water before eating, using tobacco products, using toilet facilities, or applying cosmetics.

Workers should not eat, drink, use tobacco products, or apply cosmetics in areas where o-chlorotoluene is handled, processed, or stored.

STORAGE

o-Chlorotoluene should be stored in a cool, dry, well-ventilated area in tightly sealed containers that are labeled in accordance with OSHA's hazard communication standard [29 CFR 1910.1200]. Containers of o-chlorotoluene should be protected from physical damage and should be stored separately from oxidizing materials, heat, sparks, and open flame. To prevent static sparks, containers should be grounded and bonded for transfers. Because containers that formerly contained o-chlorotoluene may still hold product residues, they should be handled appropriately.

SPILLS AND LEAKS

In the event of a spill or leak involving o-chlorotoluene, persons not wearing protective equipment and clothing should be restricted from contaminated areas until cleanup is complete. The following steps should be undertaken following a spill or leak:

1. Do not touch the spilled material; stop the leak if it is possible to do so without risk.
2. Notify safety personnel.
3. Remove all sources of heat and ignition.
4. Ventilate the area of the spill or leak.
5. Water spray may be used to reduce vapors, but the spray may not prevent ignition in closed spaces.
6. For small liquid spills, absorb with sand or other non-combustible absorbent material and gently place into closed containers for later disposal.
7. For large liquid spills, build dikes far ahead of the spill to contain the o-chlorotoluene for later reclamation or disposal.

SPECIAL REQUIREMENTS

U.S. Environmental Protection Agency (EPA) requirements for emergency planning, reportable quantities of hazardous releases, community right-to-know, and hazardous waste management may change over time. Users are therefore advised to determine periodically whether new information is available.

• Emergency planning requirements

o-Chlorotoluene is not subject to EPA emergency planning requirements under the Superfund Amendments and Reauthorization Act (SARA) [42 USC 11022].

• Reportable quantity requirements for hazardous releases

Employers are not required by the emergency release notification provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [40 CFR Part 355.40] to notify the National Response Center of an accidental release of o-chlorotoluene; there is no reportable quantity for this substance.

• Community right-to-know requirements

Employers are not required by Section 313 of SARA to submit a Toxic Chemical Release Inventory Form (Form R) to EPA reporting the amount of o-chlorotoluene emitted or released from their facility annually.

• Hazardous waste management requirements

EPA considers a waste to be hazardous if it exhibits any of the following characteristics: ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR 261.21-261.24. Although o-chlorotoluene is not specifically listed as a hazardous waste under the Resource Conservation and Recovery Act (RCRA) [42 USC 6901 et seq.], EPA requires employers to treat waste as hazardous if it exhibits any of the characteristics discussed above.

Providing detailed information about the removal and disposal of specific chemicals is beyond the scope of this guideline. The U.S. Department of Transportation, EPA, and State and local regulations should be followed to ensure that removal, transport, and disposal of this substance are conducted in accordance with existing regulations. To be certain that chemical waste disposal meets EPA regulatory requirements, employers should address any questions to the RCRA hotline at (800) 424-9346 or at (202) 382-3000 in Washington, D.C. In addition, relevant State and local authorities should be contacted for information about their requirements for waste removal and disposal.

RESPIRATORY PROTECTION

• Conditions for respirator use

Good industrial hygiene practice requires that engineering controls be used where feasible to reduce workplace concentrations of hazardous materials to the prescribed exposure limit. However, some situations may require the use of respirators to control exposure. Respirators must be worn if the ambient concentration of o-chlorotoluene exceeds prescribed exposure limits. Respirators may be used (1) before engineering controls have been installed, (2) during work operations such as maintenance or repair activities that involve unknown exposures, (3) during operations that require entry into tanks or closed vessels, and (4) during emergencies. Workers should use only respirators that have been approved by NIOSH and the Mine Safety and Health Administration (MSHA).

• Respiratory protection program

Employers should institute a complete respiratory protection program that, at a minimum, complies with the requirements of OSHA's respiratory protection standard [29 CFR 1910.134]. Such a program must include respirator selection, an evaluation of the worker's ability to perform the work while wearing a respirator, the regular training of personnel, respirator fit testing, periodic workplace monitoring, and regular respirator maintenance, inspection, and cleaning. The implementation of an adequate respiratory protection program (including selection of the correct respirator) requires that a knowledgeable person be in charge of the program and that the program be evaluated regularly. For additional information about the selection and use of respirators and about the medical screening of respirator users, consult the *NIOSH Respirator Decision Logic* [NIOSH 1987b] and the *NIOSH Guide to Industrial Respiratory Protection* [NIOSH 1987a].

PERSONAL PROTECTIVE EQUIPMENT

Protective clothing (gloves and other protective clothing, as appropriate) should be worn to prevent any skin contact with o-chlorotoluene. Chemical protective clothing should be selected on the basis of available performance data, manufacturers' recommendations, and evaluation of the clothing under actual conditions of use. Viton® may withstand permeation by o-chlorotoluene for more than 4 but fewer than 8 hr. The following materials have breakthrough times of less than 1 hr and are not recommended for use with o-chlorotoluene: butyl rubber, natural rubber, neoprene, nitrile rubber, polyvinyl chloride, and Saranex.

If o-chlorotoluene is dissolved in water or an organic solvent, the permeation properties of both the solvent and the mixture must be considered when selecting personal protective equipment and clothing.

Safety glasses, goggles, or face shields should be worn during operations in which o-chlorotoluene might contact the eyes (e.g., through splashes of solution). Eyewash fountains and emergency showers should be available within the immediate work area whenever the potential exists for eye or skin contact with o-chlorotoluene.

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