

Occupational Health Guideline for Octachloronaphthalene

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

SUBSTANCE IDENTIFICATION

- Formula: $C_{18}Cl_8$
- Synonyms: Halowax 1051
- Appearance and odor: Pale, yellow solid with an aromatic odor.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for octachloronaphthalene is 0.1 milligram of octachloronaphthalene per cubic meter of air (mg/m^3) averaged over an eight-hour work shift.

HEALTH HAZARD INFORMATION

• Routes of exposure

Octachloronaphthalene can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. Every effort should be made to prevent skin, eye, oral, or inhalation contact with this material.

• Effects of overexposure

Overexposure to octachloronaphthalene may cause an acne-like skin rash. It may also injure the liver, resulting in such effects as fatigue, dark urine, yellow jaundice, and possibly death.

• Reporting signs and symptoms

A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to octachloronaphthalene.

• Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to octachloronaphthalene at potentially hazardous levels:

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Examination of the liver should be stressed. The skin should be examined for evidence of chronic disorders.

—Liver function tests: Octachloronaphthalene may cause liver damage. A profile of liver function should be performed by using a medically acceptable array of biochemical tests.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis.

• Summary of toxicology

Octachloronaphthalene may be regarded, mainly by analogy to the lower chlorinated naphthalenes such as the penta- and hexachlor derivatives, as probably toxic to the liver and the skin. There is no information on the effects of inhalation of vapor or dust on man. Ingestion experiments on cattle suggest that the octachlor is more toxic but less readily absorbed than the hexachlor derivative. Exposure of workers by inhalation or skin absorption to mixtures of chlorinated naphthalenes with a lower chlorine content has caused a severe acne-form dermatitis termed chloracne, as well as serious liver injury.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 403.7
2. Boiling point (760 mm Hg): 410 C (770 F) (approximately)
3. Specific gravity (water = 1): 2.0
4. Vapor density (air = 1 at boiling point of octachloronaphthalene): 13.9

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

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

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

- 5. Melting point: 185 C (365 F)
- 6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
- 7. Solubility in water, g/100 g water at 20 C (68 F):

Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

- **Reactivity**

- 1. Conditions contributing to instability: Heat
- 2. Incompatibilities: Contact with strong oxidizing agents may cause fires and explosions.

3. Hazardous decomposition products: Toxic gases and vapors (such as carbon monoxide and toxic chloride fumes) may be released in a fire involving octachloronaphthalene.

4. Special precautions: None

- **Flammability**

- 1. Not combustible

- **Warning properties**

1. Odor Threshold: No quantitative information is available.

2. Eye Irritation Level: The AIHA *Hygienic Guide* states that "eye injury has not proved to be troublesome with the chloronaphthalenes."

3. Evaluation of Warning Properties: There are no quantitative data relating warning properties to air concentrations of octachloronaphthalene; therefore, this substance is treated as a material with poor warning properties. The concentration of octachloronaphthalene in saturated air at 20 C could present a significant exposure relative to the permissible exposure.

MONITORING AND MEASUREMENT PROCEDURES

- **General**

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

- **Method**

Sampling and analyses may be performed by collection of octachloronaphthalene on a filter, followed by extraction with hexane, and gas chromatographic analysis. An analytical method for octachloronaphthalene is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 2, 1977, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00260-6).

RESPIRATORS

• Good industrial hygiene practices recommend that engineering controls be used to reduce environmental

concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with molten octachloronaphthalene.

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with solid octachloronaphthalene or liquids containing octachloronaphthalene.

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent skin contact with octachloronaphthalene vapors from the heated material.

- If employees' clothing may have become contaminated with solid octachloronaphthalene, employees should change into uncontaminated clothing before leaving the work premises.

- Clothing contaminated with octachloronaphthalene should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of octachloronaphthalene from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the octachloronaphthalene, the person performing the operation should be informed of octachloronaphthalene's hazardous properties.

- Non-impervious clothing which becomes contaminated with molten octachloronaphthalene should be removed immediately and not reworn until the octachloronaphthalene is removed from the clothing.

- Non-impervious clothing which becomes contaminated with solid octachloronaphthalene or liquids containing octachloronaphthalene should be removed promptly and not reworn until the octachloronaphthalene is removed from the clothing.

- Employees should be provided with and required to use splash-proof safety goggles where there is any possibility of molten octachloronaphthalene contacting the eyes.
- Employees should be provided with and required to use splash-proof safety goggles where solid octachloronaphthalene or liquids containing octachloronaphthalene may contact the eyes.

SANITATION

- Workers subject to skin contact with octachloronaphthalene should wash with soap or mild detergent and water any areas of the body which may have contacted octachloronaphthalene at the end of each work day.
- Skin that becomes contaminated with octachloronaphthalene should be promptly washed or showered with soap or mild detergent and water to remove any octachloronaphthalene.
- Eating and smoking should not be permitted in areas where solid octachloronaphthalene is handled, processed, or stored.
- Employees who handle solid octachloronaphthalene or liquids containing octachloronaphthalene should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to octachloronaphthalene may occur and control methods which may be effective in each case:

Operation	Controls
Use during manufacture of electric equipment as an insulating material; pouring molten solvent or finely ground solid materials; dipping; peeling and covering insulated cable with fabric	Local exhaust ventilation; general dilution with intake and exhaust fans; personal protective equipment
Liberation from use of electrical equipment insulated with octachloronaphthalene/pentachloronaphthalene	Local exhaust ventilation; general dilution ventilation; personal protective equipment

Operation

Use as an inert compound of resins or polymers for coating or impregnating textiles, wood, and paper to impart flame resistance, water proofness, and fungicidal and insecticidal properties

Use as an additive for cutting oil in various operations performed on metals

Use as an additive to special lubricants in crankcase oil, lubricants for farm machinery, and extreme-pressure lubricants

Controls

Process enclosure; local exhaust ventilation; general dilution with intake and exhaust fans; personal protective equipment

Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment

General dilution ventilation

EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

• Eye Exposure

If solid octachloronaphthalene or liquids containing octachloronaphthalene get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention. If molten octachloronaphthalene gets into the eyes, immediately flush the eyes with large amounts of water to remove heat. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.

• Skin Exposure

If non-impervious clothing becomes contaminated with octachloronaphthalene, remove and clean the clothing before wearing it again. If non-impervious clothing becomes heavily contaminated, it should be destroyed. If solid octachloronaphthalene or liquids containing octachloronaphthalene get on the skin, promptly wash the contaminated skin using soap or mild detergent and water. If skin irritation persists after washing, get medical attention. If molten octachloronaphthalene gets on the skin or non-impervious clothing, immediately flush the affected area with large amounts of water to remove heat. Get medical attention immediately.

• Breathing

If a person breathes in large amounts of octachloronaphthalene, move 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.

- **Swallowing**

When octachloronaphthalene has been swallowed, get medical attention immediately. If medical attention is not immediately available, get the afflicted person to vomit by having him touch the back of his throat with his finger or by giving him syrup of ipecac as directed on the package. This non-prescription drug is available at most drug stores and drug counters and should be kept with emergency medical supplies in the workplace. Do not make an unconscious person vomit.

- **Rescue**

Move the 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. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

SPILL AND DISPOSAL PROCEDURES

- Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed.

- If octachloronaphthalene is spilled, the following steps should be taken:

1. Ventilate area of spill.

2. Collect spilled material in the most convenient and safe manner for reclamation or for disposal in a secured sanitary landfill. Liquids containing octachloronaphthalene should be absorbed in vermiculite, dry sand, earth, or a similar material.

- **Waste disposal method:**

Octachloronaphthalene may be disposed of in a secured sanitary landfill.

REFERENCES

- American Conference of Governmental Industrial Hygienists: "Octachloronaphthalene," *Documentation of the Threshold Limit Values for Substances in Workroom Air* (3rd ed., 2nd printing), Cincinnati, 1974.
- American Industrial Hygiene Association: "Chloronaphthalenes," *Hygienic Guide Series*, Detroit, Michigan, 1966.
- Hunter, D.: *Diseases of Occupations* (4th ed.), Little, Brown, Boston, 1969.
- International Labour Office: *Encyclopedia of Occupational Health and Safety*, McGraw-Hill, New York, 1971.
- Koppers Corporation: *Material Safety Data Sheet - Octachloronaphthalene*.
- Patty, F. A. (ed.): *Toxicology*, Vol. II of *Industrial Hygiene and Toxicology* (2nd ed. rev.), Interscience, New York, 1963.
- Sax, N. I.: *Dangerous Properties of Industrial Materials* (3rd ed.), Van Nostrand Reinhold, New York, 1968.

RESPIRATORY PROTECTION FOR OCTACHLORONAPHTHALENE

Condition	Minimum Respiratory Protection* Required Above 0.1 mg/m ³
Particulate Concentration	
1 mg/m ³ or less	Any supplied-air respirator. Any self-contained breathing apparatus.
5 mg/m ³ or less	Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
100 mg/m ³ or less	A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
200 mg/m ³ or less	A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode.
Greater than 200 mg/m ³ or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	Any gas mask providing protection against organic vapors and particulates. Any escape self-contained breathing apparatus.

*Only NIOSH-approved or MSHA-approved equipment should be used.

