

OCCUPATIONAL SAFETY AND HEALTH GUIDELINE FOR 2-CHLORO-6-TRICHLOROMETHYL PYRIDINE

INTRODUCTION

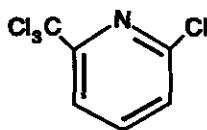
This guideline summarizes pertinent information about 2-chloro-6-trichloromethyl pyridine for workers and employers as well as for physicians, industrial hygienists, and other occupational safety and health professionals who may need such information to conduct effective occupational safety and health 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 Recommendations may be superseded by new developments in these fields; readers are therefore advised to regard these recommendations as general guidelines and to determine periodically whether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

Nitrapyrin; α,α,α -6-tetrachloro-2-picoline; N-Serve, N-Serve nitrogen stabilizer; Dowco-163

• Identifiers:

1. CAS No.: 1929-82-4
2. RTECS No.: US7525000

3. DOT UN: None

4. DOT label: None

• Appearance and odor

2-Chloro-6-trichloromethyl pyridine is a colorless or white, crystalline solid.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 230.93
2. Boiling point (11 mm Hg): 136°–137.5°C (276.8°–279.5°F)
3. Specific gravity (water = 1): Data not available
4. Vapor density: Not applicable
5. Melting point: 62.5°–62.9°C (144.5°–145.2°F)
6. Vapor pressure: 0.0028 mm Hg at 23°C (73.4°F)
7. Solubility: Insoluble in water
8. Evaporation rate: Data not available

• Reactivity

1. Conditions contributing to instability: Heat
2. Incompatibilities: Aluminum, magnesium, or their alloys

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

3. Hazardous decomposition products: Toxic gases (such as chlorine and oxides of nitrogen) may be released in a fire involving 2-chloro-6-trichloromethyl pyridine.

4. Special precautions: None

Flammability

The National Fire Protection Association has not assigned a flammability rating for 2-chloro-6-trichloromethyl pyridine.

1. Flash point: Data not available

2. Autoignition temperature: Data not available

3. Flammable limits in air: Data not available

4. Extinguishant: Use an extinguishant that is suitable for the materials involved in the surrounding fire.

Fires involving boron oxide should be fought upwind from the maximum distance possible. Isolate the hazard area and deny access to unnecessary personnel. Firefighters should wear a full set of protective clothing and self-contained breathing apparatus when fighting fires involving 2-chloro-6-trichloromethyl pyridine.

EXPOSURE LIMITS

OSHA PEL

The current Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) for 2-chloro-6-trichloromethyl pyridine are 15 mg/m³ (total dust) and 5 mg/m³ (respirable fraction) as 8-hr time-weighted average (TWA) concentrations [29 CFR 1910.1000, Table Z-1].

NIOSH REL

The National Institute for Occupational Safety and Health (NIOSH) has established recommended exposure limits (RELs) of 10 mg/m³ (total dust) and 5 mg/m³ (respirable fraction) as TWAs for up to a 10-hr workday and a 40-hr workweek and a short-term exposure limit (STEL) of 20 mg/m³. The 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 2-chloro-6-trichloromethyl pyridine a threshold limit value (TLV) of 10 mg/m³ as a TWA for a normal 8-hr workday and a 40-hr workweek and a short-term exposure limit (STEL) of 20 mg/m³ for periods not to exceed 15 min. Exposures at the STEL concentration should not be repeated more than four times a day and should be separated by intervals of at least 60 min [ACGIH 1991].

Rationale for limits

The OSHA limits are based on the risk of physical irritation associated with exposure to 2-chloro-6-trichloromethyl pyridine [54 Fed. Reg. 2592 (1989)].

HEALTH HAZARD INFORMATION

Routes of exposure

Exposure to 2-chloro-6-trichloromethyl pyridine can occur through inhalation, ingestion, eye or skin contact, and absorption through the skin.

Summary of toxicology

1. *Effects on Animals:* In animals, 2-chloro-6-trichloromethyl pyridine is moderately toxic when ingested or absorbed through the skin. The dermal LD₅₀ in rabbits is 850 mg/kg [NIOSH 1993; Sax and Lewis 1989]. The oral LD₅₀s in rats, mice, and rabbits are 940 mg/kg, 710 mg/kg, and 500 mg/kg respectively [NIOSH 1993; Sax and Lewis 1989]. Dogs and rats fed 15 mg/kg 2-chloro-6-trichloromethyl pyridine daily for 93 days showed no adverse effects on behavior, growth, food consumption, body and organ weights, mortality, or serum chemistries; at autopsy, no gross or microscopic changes to the organs or tissues were detectable [ACGIH 1991]. Male rats fed concentrations of 1,000 ppm in the diet for 2 years had a statistically significant reduction in mean body weight at 12 months, but not at 18 and 24 months. No effects were recorded at lower concentrations. Female rats fed between 30 and 1,000 ppm for 2 years had an increased incidence of bile duct hyperplasia [Dow Chemical USA 1967].

2, *Effects on Humans*: There are no data on the acute or chronic effects of exposure to 2-chloro-6-trichloromethyl pyridine in humans.

• **Signs and symptoms of exposure**

1. *Acute exposure*: Acute exposure to 2-chloro-6-trichloromethyl pyridine may irritate the eyes, nose, throat, and skin. Higher levels may cause dizziness and lightheadness.

2. *Chronic exposure*: Chronic exposure to 2-chloro-6-trichloromethyl pyridine may cause dizziness, headaches, loss of appetite and insomnia. Repeated exposure may affect the liver and kidneys.

• **Emergency procedures**

WARNING!

Seek immediate medical attention for severely affected victims or for victims with signs and symptoms of toxicity or irritation!

Keep unconscious victims warm and on their side to avoid choking if vomiting occurs. Initiate the following emergency procedures:

1. *Eye exposure*: Irritation may result. **Immediately and thoroughly** flush the eyes with large amounts of water, occasionally lifting the upper and lower eyelids.

2. *Skin exposure*: Skin irritation or absorption of toxic amounts may result. **Immediately** remove contaminated clothing and **thoroughly** wash contaminated skin with soap and water.

3. *Inhalation exposure*: Move the victim to fresh air **immediately**. Have 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 2-chloro-6-trichloromethyl pyridine or any material containing it is ingested:

—Have the victim rinse the contaminated mouth cavity several times with a fluid such as water.

—Have the victim drink a glass (8 oz) of fluid such as water.

—Induce vomiting by giving syrup of ipecac as directed on the package. If ipecac is unavailable, have the victim touch the back of the throat with a finger until productive vomiting ceases.

—Do *not* force an unconscious or convulsing person to drink fluid or to vomit.

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 2-chloro-6-trichloromethyl pyridine and result in worker exposures to this substance:

—Use as a fertilizer additive to control nitrification and prevent loss of soil nitrogen from land to be planted with corn, cotton, wheat, or sorghum

—Manufacture, formulation, and application of 2-chloro-6-trichloromethyl pyridine-containing products

Methods that are effective in controlling worker exposures to 2-chloro-6-trichloromethyl pyridine, depending on the feasibility of implementation, are:

—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 2-chloro-6-trichloromethyl pyridine, a 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 kidneys, liver, eyes, and skin.

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 2-chloro-6-trichloromethyl pyridine 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) including a history and other findings consistent with diseases of the kidneys, liver, eyes, or skin.

• 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 2-chloro-6-trichloromethyl pyridine exposure. The interviews, examinations, and medical screening tests should focus on identifying the adverse effects of 2-chloro-6-trichloromethyl pyridine on the kidneys, liver, eyes, or skin. 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 2-chloro-6-trichloromethyl pyridine.

• 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

The OSHA method for determining worker exposure to airborne concentrations of 2-chloro-6-trichloromethyl

pyridine (total dust) is made using a tared, low-ash polyvinyl chloride filter with a 5-micron pore size; the filter is contained in a 37-mm cassette. Samples are collected at a maximum flow rate of 2 liters/min until a maximum air volume of 960 liters is collected. Analysis is conducted by gravimetric measurement (weighing) of the filter. This method has a sampling and analytical error of 0.10 and is included in the *OSHA Chemical Information Manual* as Particulates not otherwise regulated (Total Dust) [OSHA 1987].

The OSHA method for determining worker exposure to airborne concentrations of 2-chloro-6-trichloromethyl pyridine (respirable fraction) is made using a tared, low-ash polyvinyl chloride filter with a 5-micron pore size; the filter is contained in a 37-mm cassette. Air is drawn through the filter cassette, which is preceded by a 10-mm nylon cyclone, at a flow rate of 1.7 liter/min until a maximum air volume of 816 liters is collected. Analysis is conducted by gravimetric measurement (weighing) of the filter. This method has a sampling and analytical error of 0.10 and is included in the *OSHA Chemical Information Manual* as Particulates not otherwise regulated (Respirable Fraction) [OSHA 1987].

PERSONAL HYGIENE

If 2-chloro-6-trichloromethyl pyridine contacts the skin, workers should wash the skin with soap and water.

Clothing contaminated with 2-chloro-6-trichloromethyl pyridine should be removed.

A worker who handles 2-chloro-6-trichloromethyl pyridine should thoroughly wash hands, forearms, and face with soap and water before eating, using tobacco products, using toilet facilities, or apply cosmetics.

Workers should not eat, drink, use tobacco products, or apply cosmetics in areas where 2-chloro-6-trichloromethyl pyridine or a solution containing 2-chloro-6-trichloromethyl pyridine is handled, processed, or stored.

STORAGE

2-Chloro-6-trichloromethyl pyridine 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]. This substance should not be stored in unlined containers or be pumped with equipment made of aluminum, magnesium, or alloys of these metals. Containers of 2-chloro-6-trichloromethyl pyridine should be protected from physical damage and

should be stored separately from heat, sparks, and open flame.

SPILLS AND LEAKS

In the event of a spill or leak involving 2-chloro-6-trichloromethyl pyridine, persons not wearing protective equipment and clothing should be restricted from contaminated areas until cleanup is complete. No specific information is available on clean-up procedures for spills or leaks involving this substance.

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**

2-Chloro-6-trichloromethyl pyridine 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) [42 CFR 355.40] to notify the National Response Center of an accidental release of 2-chloro-6-trichloromethyl pyridine; 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 2-chloro-6-trichloromethyl pyridine 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 2-chloro-6-trichloromethyl pyridine is not specifically listed as a hazardous waste under the Resource Conservation and Recovery Act (RCRA) [40 USC 6901 et seq.], EPA requires employers to treat any 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 2-chloro-6-trichloromethyl pyridine 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 should be worn to prevent prolonged or repeated skin contact with 2-chloro-6-trichloromethyl pyridine. 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. No reports have been published on the resistance of various protective clothing materials to 2-chloro-6-trichloromethyl pyridine. If permeability data are not readily available, protective clothing manufacturers should be requested to provide information on the best chemical protective clothing for workers to wear when they are exposed to 2-chloro-6-trichloromethyl pyridine.

If 2-chloro-6-trichloromethyl pyridine is dissolved in 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 2-chloro-6-trichloromethyl pyridine might contact the eyes (e.g., through dust particles or 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 2-chloro-6-trichloromethyl pyridine. Contact lenses should not be worn if the potential exists for 2-chloro-6-trichloromethyl pyridine exposure.

REFERENCES CITED

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