



Material Safety Data Sheet

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Rockville, MD 20852 USA

Phone Calls: 301-816-8129
8 a.m. to 5 p.m. EST Mon. - Fri.

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RESIDUAL SOLVENT CLASS 2 - CHLOROFORM

Catalog Number: 1601383

Revision Date:

March 20, 2009

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Common Name: Chloroform

Manufacturer: U. S. Pharmacopeia

Responsible Party: Reference Standards Technical Services

Mailing Address: 12601 Twinbrook Parkway, Rockville, MD 20852 USA

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Product Use: USP Reference Standards and Authentic Substances are used for chemical tests and assays in analytical, clinical, pharmaceutical, and research laboratories.

SECTION 2 - HAZARD INFORMATION

This reference standard contains chloroform in dimethyl sulfoxide (DMSO). The mixture has not been tested to determine specific physical hazards, but it is considered potentially combustible.

DMSO is an irritant and is rapidly absorbed through the skin. It may carry dissolved chemicals into the body through this route.

Chloroform is toxic, an irritant, and a possible human carcinogen.

Adverse Effects: Adverse effects of DMSO may include redness, itching, or rash on skin; garlic-like taste or odor on breath and skin; swelling of face; troubled breathing; shortness of breath; and nasal congestion. Adverse effects of chloroform exposure may include nausea, vomiting, loss of appetite, drowsiness, giddiness, disorientation, fatigue, fainting sensation, headache, chest pain, loss of feeling or sensation, salivation, sensation of warmth, frequent burning urination, irritation, dry mouth, thirst, hallucinations, staggering, shortness of breath, pupil dilation with decreased reaction to light, sweet odor on breath, and cold clammy skin. Possible allergic reaction to material if inhaled, ingested, or in contact with skin.

Overdose Effects: Chloroform overdose may cause low blood pressure, insufficient oxygen in the blood, loss of consciousness, cardiorespiratory depression and failure, coma, and death.

Acute: Eye, skin, gastrointestinal and/or respiratory tract irritation; central nervous system and cardiac depression.

Chronic: Possible hypersensitization, gastrointestinal and neurological disturbances, liver damage, and cancer.

Medical Conditions Aggravated by Exposure: Hypersensitivity to material; porphyria; alcoholism; and diseases of the liver, kidneys, or central nervous system.

Cross Sensitivity: n/f

Target Organs: Central nervous system, liver, heart, kidneys (Chloroform)

For additional information on toxicity, see Section 11.

SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENTS

Common Name: Chloroform

Formula: See Composition

Synonym: Trichloromethane

Chemical Name: Methane, trichloro- in dimethyl sulfoxide

CAS: See Composition

RTECS Number: See Composition

Chemical Family: Halogenated hydrocarbon (Chloroform)

Therapeutic Category: Residual solvent

Composition: Chloroform (CHCl₃; CAS # 67-66-3; RTECS # FS9100000): 0.03%
Dimethyl sulfoxide (C₂H₆OS; CAS # 67-68-5; RTECS # PV6210000): 99.97%

SECTION 4 - FIRST AID MEASURES

Inhalation: Causes irritation and toxicity. Remove to fresh air. Chloroform is readily absorbed through the lungs.

Eye: Causes irritation. Flush with copious quantities of water for at least 15 minutes.

Skin: Causes irritation. Flush with copious quantities of soap and water. DMSO readily penetrates the skin and can enhance absorption of other chemicals.

Ingestion: Causes irritation and toxicity. Flush out mouth with water. Chloroform is absorbed from the gastrointestinal tract.

General First Aid Procedures: Remove from exposure. Remove contaminated clothing. Persons developing serious hypersensitivity (anaphylactic) reactions must receive immediate medical attention. If person is not breathing, give artificial respiration. If breathing is difficult, give oxygen. Obtain medical attention.

Note to Physicians

Overdose Treatment: Treatment of chloroform overdose should be symptomatic and supportive and may include the following:

1. Do not induce vomiting because the patient may become rapidly obtunded.
2. Patient should be admitted and observed for delayed toxicity. Urinalysis, liver and kidney function tests, chest x-ray, ECG, fluid and electrolyte status, and cardiac monitoring may be useful following exposure.
3. Ventilatory assistance may be necessary if there is profound CNS depression or acute respiratory distress.
4. Administration of fluids may be useful to preserve kidney function.
5. N-acetylcysteine has been proposed as a possible treatment for poisoning by chlorinated hydrocarbon solvents; this treatment is considered experimental. [Poisindex 2009]

SECTION 5 - FIREFIGHTING MEASURES

Extinguisher Media: Alcohol foam or other appropriate media.

Fire and Explosion Hazards: DMSO is combustible and reacts violently with many acyl, aryl, and non-metal halides, boron compounds and metal salts of oxoacids. Vapors may form explosive mixtures with air. Vapors may travel to sources of ignition and flash back.

Firefighting Procedures: As with all fires, evacuate personnel to a safe area. Firefighters should use self-contained breathing equipment and protective clothing.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spill Response: Wear approved respiratory protection, chemically compatible gloves, and protective clothing. Remove all ignition sources. Ventilate enclosed spaces. Wipe up spillage. Avoid breathing vapors. Place spillage and all contaminated cleanup materials in a thick plastic hazardous waste disposal bag or leakproof container and label it CAUTION: HAZARDOUS CHEMICAL WASTE. Wash spill site.

SECTION 7 - HANDLING AND STORAGE

Handling: As a general rule, when handling USP Reference Standards, avoid all contact and inhalation of dust, mist, and/or vapor associated with the material. Wash thoroughly after handling.

Storage: Store in tight, light-resistant container as defined in the USP-NF. This material should be handled and stored per label instructions to ensure product integrity.

SECTION 8 - EXPOSURE CONTROL / PERSONAL PROTECTION

Engineering Controls: Engineering controls such as exhaust ventilation are recommended.

Respiratory Protection: Use a NIOSH-approved respirator, if it is determined to be necessary by an industrial hygiene survey involving air monitoring.

Gloves: Chemically compatible

Eye Protection: Safety goggles or glasses

Protective Clothing: Protect exposed skin.

Exposure Limits: Chloroform:
OSHA: TWA 2 ppm; CL 50 ppm
NIOSH: STEL 2 ppm; IDLH 500 ppm
ACGIH: TWA 10 ppm

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Properties as indicated on the MSDS are general and not necessarily specific to the USP Reference Standard Lot provided.

Appearance and Odor: Colorless liquid.

Odor Threshold: n/f

pH: n/f

Melting Range: n/f

Boiling Point: n/f

Flash Point: n/f

Autoignition Temperature: n/f

Evaporation Rate: n/f

Upper Flammability Limit: n/f

Lower Flammability Limit: n/f

Vapor Pressure: n/f

Vapor Density: n/f

Specific Gravity: n/f

Solubility in Water: n/f

Fat Solubility: n/f

Other Solubility: n/f

Partition Coefficient: n-octanol/water: n/f

Percent Volatile: n/f

Reactivity in Water: n/f

Explosive Properties: n/f

Oxidizing Properties: n/f

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Formula: See Composition**Molecular Weight:** n/f

SECTION 10 - STABILITY AND REACTIVITY

Conditions to Avoid: Avoid exposure to light.

Incompatibilities: Chloroform: Strong oxidizing agents, strong bases, magnesium, sodium/sodium oxides, and lithium.

Decomposition Products: When heated to decomposition, material emits toxic fumes of phosgene, HCl, and chlorine. Emits toxic fumes under fire conditions.

Stable? Yes **Hazardous Polymerization?** No

SECTION 11 - TOXICOLOGICAL PROPERTIES

Oral Rat: LD50: 695 mg/kg (Chloroform); 14500 mg/kg (DMSO)

Oral Mouse: LD50: 36 mg/kg (Chloroform); 7920 mg/kg (DMSO)

Other Toxicity Data: DMSO:

Inhalation Rat LC50: > 25 mg/L/40 hr

Skin Mouse LD50: 50 grams/kg

Skin Rat LD50: 40 grams/kg

Irritancy Data: Skin/rabbit: mild; Eye/rabbit: moderate (Chloroform); Skin, Eye/rabbit: mild (DMSO)

Corrosivity: n/f

Sensitization Data: DMSO:

Guinea Pig Buehler Test: not sensitizing

Listed as a Carcinogen by: **NTP:** Yes **IARC:** Yes **OSHA:** No

Other Carcinogenicity Data: Chloroform is a probable carcinogen in humans by all routes of high exposure that leads to cytotoxicity and regenerative hyperplasia based on sufficient evidence in experimental animals. Chloroform was positive in nonhuman in vivo carcinogenicity studies. There is some evidence that it causes liver, kidney, and thyroid cancer in animals. Chloroform was carcinogenic in male mice and rats and in female mice, but not in female rats.

Mutagenicity Data: Chloroform:

Chloroform is not strongly mutagenic in humans and is not mutagenic in animals. There is weak evidence for the genotoxicity of chloroform in experimental systems in vivo and in mammalian cells, fungi, and yeast in vitro. It was not mutagenic to bacteria (negative in the Ames S. typhimurium test). It was also negative in mouse micronuclei in vivo, for chromosomal aberrations, for sister chromatid exchanges, for unscheduled DNA synthesis, and in human lymphocytes in vitro.

DMSO:

Dimethyl sulfoxide did not show a potential to induce gene mutations in bacterial or yeast cells, and was not mutagenic in in vivo studies in Drosophila. Dimethyl sulfoxide did not induce micronuclei or sister-chromatid exchange in mice or chromosomal aberrations or sister chromatid exchange in mammalian cells, but did induce an increase in chromosomal aberrations in rats.

Reproductive and Developmental Effects: Chloroform:

Some reports suggest that chloroform does not cause birth defects in rabbits or rats but does cause developmental delays associated with maternal toxicity. Other reports indicate that chloroform can induce skeletal and visceral anomalies and cleft palate in mice and rats. The frequency of cleft palate was increased among the offspring of pregnant mice exposed chronically to chloroform vapors in a concentration of 100 ppm.

The frequency of birth defects was no greater than expected among the children of 128 laboratory workers exposed to chloroform during the first trimester of pregnancy.

DMSO:

Examination of the reproductive system during a 13-week inhalation repeated-dose toxicity study in rats revealed no abnormalities on estrus cycle in females, sperm count,

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motility or morphology in males, or on the reproductive organs of both sexes. In two oral developmental toxicity studies in rats, maternal effects included decreased food consumption and decreased body weight gain. Developmental effects included decreased fetal weights, higher rates of early resorptions per animal, increased total post-implantation loss, dilated renal pelvis, dilated ureters and reduced or delayed ossification of ribs. All of the fetal effects except dilated renal pelvis occurred at levels that demonstrated maternal toxicity.

SECTION 12 - ECOLOGICAL INFORMATION

Ecological Information: Chloroform:
Fish LC50: > 100 mg/L/96 hr
Toxic to aquatic organisms.

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal: Place material in a thick plastic hazardous waste disposal bag or leakproof container and label it CAUTION: HAZARDOUS CHEMICAL WASTE. Dispose of waste in accordance with all applicable Federal, State, and local laws.

SECTION 14 - TRANSPORT INFORMATION

Shipping Name: Chloroform 0.03% Solution

Class: 6.1

UN Number: UN1888

Packing Group: III

Additional Transport Information: n/f

SECTION 15 - REGULATORY INFORMATION

U.S. Regulatory Information: Chloroform:
California Proposition 65: Carcinogen

International Regulatory Information: Chloroform:
EINECS # 200-663-8

DMSO:
EINECS # 200-664-3

SECTION 16 - OTHER INFORMATION

Revision: 20-Mar-09

Previous Revision Date: 29-Sep-03