



Material Safety Data Sheet

12601 Twinbrook Parkway,
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 1 - CARBON TETRACHLORIDE

Catalog Number: 1601168

Revision Date:

August 4, 2008

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Common Name: Carbon Tetrachloride

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

EMERGENCY OVERVIEW: Cancer Suspect Agent. Toxic. Irritant. Combustible.

This reference standard contains carbon tetrachloride 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.

Carbon tetrachloride is toxic, irritant, and a cancer suspect agent.

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; nasal congestion; gastrointestinal disturbances; drowsiness; and headache. Adverse effects from carbon tetrachloride exposure may include nausea, vomiting, abdominal pain, diarrhea, headache, dizziness, drowsiness, defatting dermatitis, and confusion. Possible allergic reaction to material if inhaled, ingested or in contact with skin.

Overdose Effects: In addition to the effects listed above, prolonged exposure or exposure to high levels of carbon tetrachloride may lead to liver damage (jaundice, enlarged liver), kidney damage (dark urine or decrease in urination), convulsions, and coma. Death may occur from respiratory depression, circulatory collapse, or ventricular arrhythmia.

Acute: Acute effects of carbon tetrachloride exposure include eye, skin, gastrointestinal and/or respiratory tract irritation; central nervous system depression, and liver and kidney damage.

Chronic: Chronic effects from carbon tetrachloride include possible hypersensitization; central nervous system depression; tingling, prickling, or numbness of skin; anemia; vision and gastrointestinal disturbances; liver and kidney damage; and cancer.

Medical Conditions Aggravated by Exposure: Hypersensitivity to material, active alcoholism, and impaired liver or kidney function.

Cross Sensitivity: n/f

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Target Organs: Central nervous system, liver, kidneys (Carbon tetrachloride)

For additional information on toxicity, see Section 11.

SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENTS

Common Name: Carbon Tetrachloride

Formula: See Composition

Synonym: Tetrachloromethane

Chemical Name: Methane, tetrachloro- in dimethyl sulfoxide

CAS: See Composition

RTECS Number: See Composition

Chemical Family: Halogenated hydrocarbon (Carbon tetrachloride)

Therapeutic Category: Residual solvent

Composition: Carbon tetrachloride (CCl₄; CAS #56-23-5; RTECS # FG4900000): 2%
Dimethyl sulfoxide (C₂H₆OS; CAS # 67-68-5; RTECS # PV6210000): 98%

SECTION 4 - FIRST AID MEASURES

Inhalation: Causes irritation and toxicity. Avoid inhalation. Remove to fresh air. Carbon tetrachloride is readily absorbed through the lungs.

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

Skin: Causes irritation. Avoid contact. 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. Avoid ingestion. Flush out mouth with water. Carbon tetrachloride is readily 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 carbon tetrachloride overdose should be symptomatic and supportive and may include the following:

1. Do NOT induce vomiting.
2. Administer activated charcoal as a slurry.
3. Perform gastric lavage soon after ingestion (within one hour). Protect airway by placement in Trendelenburg and left lateral decubitus position or by endotracheal intubation. Control any seizures first.
4. Follow-up radiography may assess the success of the gastric emptying.
5. Monitor liver and renal function tests. Monitor EKG in symptomatic patients. Provide intensive supportive care in patients with severe renal and hepatic injury.
6. AVOID epinephrine due to the possibility of inducing ventricular arrhythmias. AVOID enzyme-inducing agents (i.e. phenobarbital), as these drugs increase toxicity.
7. For hypotension, infuse isotonic fluid. If hypotension persists, administer dopamine or norepinephrine.
8. For ventricular dysrhythmias, institute cardiac monitoring, obtain ECG, and administer oxygen. Evaluate for hypoxia, acidosis, and electrolyte disorders. For stable monomorphic ventricular tachycardia, particularly in patients with underlying impaired cardiac functions, lidocaine and amiodarone are first line agents. Use amiodarone with CAUTION. Unstable rhythms require immediate cardioversion.
9. To protect against hepatic injury, administer N-acetylcysteine and pyridoxine early after overdose. To reduce hepatic injury, consider hyperbaric and normobaric oxygen.
10. Peritoneal or hemodialysis may be useful very early in clinical course with unmetabolized carbon tetrachloride. There is insufficient data for the efficacy of hemodialysis in management of carbon tetrachloride poisoning. [Meditext 2008]

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. This mixture has not been tested.

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 ignition sources. Ventilate enclosed spaces. Absorb with suitable material. Do not flush into a confined space such as a sewer. 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, mists, and/or vapors 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. Store in a refrigerator.

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 glasses or goggles

Protective Clothing: Protect exposed skin.

Exposure Limits: Carbon tetrachloride:

OSHA : TWA 10 ppm; CEILING 25 ppm; peak 200 ppm (5 min. every 4 hr.)

NIOSH: STEL 2 ppm; IDLH 200 ppm

ACGIH: TWA 5 ppm (skin); STEL 10 ppm (skin)

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

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

SECTION 10 - STABILITY AND REACTIVITY
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Conditions to Avoid: Avoid exposure to light and heat.

Incompatibilities: n/f

Decomposition Products: When heated to decomposition material emits toxic fumes. Emits toxic fumes under fire conditions.

Stable? Yes **Hazardous Polymerization?** No

SECTION 11 - TOXICOLOGICAL PROPERTIES
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Oral Rat: Carbon tetrachloride:
LD50: 2350 mg/kg

DMSO:
LD50: 14500 mg/kg

Oral Mouse: Carbon tetrachloride:
LD50: 8263 mg/kg

DMSO:
LD50: 7920 mg/kg

Other Toxicity Data: Carbon tetrachloride:
Inhalation Rat LC50: 8000 ppm/4hr
Inhalation Mouse LC50: 9526 ppm/8hr
Skin Rat LD50: 5070 mg/kg
Skin Rabbit LD50: >20 grams/kg

DMSO:
Inhalation Rat LC50: >25 mg/L/40 hour
Skin Mouse LD50: 50 grams/kg
Skin Rat LD50: 40 grams/kg

Irritancy Data: Carbon tetrachloride:
Rabbit/skin (Standard Draize, 500mg/24hr): mild
Rabbit/skin (Standard Draize, 4mg): mild
Rabbit/eye (Standard Draize, 500mg/24hr): mild
Rabbit/eye (Standard Draize, 2200 micrograms/30sec): mild

DMSO:
Rabbit/skin (Standard Draize, 500 mg/24 hour): mild
Rabbit/skin (Open Draize, 10 mg/24 hour): mild
Rabbit/eye (Standard Draize, 500 mg/24 hour): mild

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: Carbon tetrachloride:
Liver cancers have occurred in humans following chronic exposure and single high-dose exposure to carbon tetrachloride. A possible association with brain tumors, lymphatic leukemias, and lymphosarcomas has been reported, and a retrospective occupational study shows evidence of an association for increased breast cancer in whites exposed to carbon tetrachloride.
Carbon tetrachloride increased in the incidences of hepatomas and hepatocellular carcinomas in mice of both sexes when administered by gavage, increased the incidence of neoplastic nodules of the liver in rats of both sexes when administered by gavage, induced hepatocellular carcinomas in male rats and mammary adenocarcinomas in female rats when administered by subcutaneous injection, induced liver

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carcinomas in rats when administered by inhalation, and induced nodular hypoplasia of the liver in male mice when administered intrarectally.

Mutagenicity Data: Carbon tetrachloride:
Carbon tetrachloride induced DNA damage and repair and unscheduled DNA synthesis in experimental animals; mutations, gene conversions, mitotic recombination, sex chromosome loss, and nondisjunction in microorganisms; and chromosome loss in hamster lung cells. It was mutagenic in *E. coli*, with and without activation, and *S. typhimurium* TA98, without activation, but not in *S. typhimurium* TA100, TA1535, or TA1537.

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. [EPA 2007]

Reproductive and Developmental Effects: Carbon tetrachloride:
Carbon tetrachloride adversely affected the sperm, sperm duct, and epididymus in male rats administered 7691 mg/kg intraperitoneally during pregnancy. Testicular atrophy and decreased sperm count also occurred.
Post-implantation mortality was induced in rats given 2 grams/kg orally and extra-embryonic structures were affected at 3 grams/kg. Liver damage occurred in rat fetuses when carbon tetrachloride was administered late in pregnancy and fetotoxicity, and birth defects occurred in rats administered 300 ppm/7hr by inhalation. No birth defects occurred in rats administered 0.3 ml orally, in rats administered 0.8 ml subcutaneously, in mice administered 1/10 and 1/100 the LD50, or in rabbits.

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, 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. [EPA 2007]

SECTION 12 - ECOLOGICAL INFORMATION

Ecological Information: n/f

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: Carbon Tetrachloride 2% Solution

Class: 6.1

UN Number: UN1846

Packing Group: II

Additional Transport Information: n/f

SECTION 15 - REGULATORY INFORMATION

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U.S. Regulatory Information: Carbon tetrachloride:
EPCRA Sec. 304 RQ: 10 lbs (4.54 kg)
California Proposition 65: Carcinogen

International Regulatory Information: Carbon tetrachloride:
EINECS # 200-262-8
Hazard Code: T, N
Risk Phrases: R23/24/25, R40, R48/23, R59

DMSO:
EINECS # 200-664-3

SECTION 16 - OTHER INFORMATION

Revision: 04-Aug-08

Previous Revision Date: 25-Sep-03