

## 1. Material Identification

**Product Name** : Carbon tetrachloride

**Catalog Number** : io-1929

**CAS Number** : 56-23-5

**Identified uses** : Laboratory chemicals, manufacture of chemical compounds

**Company** : IonZ

>> R&D Use only

## 2. Hazards Identification

### GHS Classification:

Flammable liquid ( category 2 )

Acute toxicity, oral (Category 3)

Acute toxicity, dermal (Category 3)

Acute toxicity, inhalation (Category 3)

Specific target organ toxicity, single exposure (Category 1)

### Pictogram(s)



### GHS Hazard Statements

- >> H301+H311+H331 (26.2%): Toxic if swallowed, in contact with skin or if inhaled [Danger Acute toxicity, oral; acute toxicity, dermal; acute toxicity, inhalation]
- >> H301 (100%): Toxic if swallowed [Danger Acute toxicity, oral]
- >> H311 (100%): Toxic in contact with skin [Danger Acute toxicity, dermal]
- >> H317 (50%): May cause an allergic skin reaction [Warning Sensitization, Skin]
- >> H331 (100%): Toxic if inhaled [Danger Acute toxicity, inhalation]
- >> H351 (100%): Suspected of causing cancer [Warning Carcinogenicity]
- >> H372 (98.3%): Causes damage to organs through prolonged or repeated exposure [Danger Specific target organ toxicity, repeated exposure]
- >> H412 (95.2%): Harmful to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]
- >> H420 (82.2%): Harms public health and the environment by destroying ozone in the upper atmosphere [Warning Hazardous to the ozone layer]

### Precautionary Statement Codes

- >> P203, P260, P261, P262, P264, P270, P271, P272, P273, P280, P301+P316, P302+P352, P304+P340, P316, P318, P319, P321, P330, P333+P317, P361+P364, P362+P364, P403+P233, P405, P501, and P502

### NFPA 704 Diamond



### NFPA Health Rating

- >> 3 – Materials that, under emergency conditions, can cause serious or permanent injury.

#### NFPA Fire Rating

- >> 0 – Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

#### NFPA Instability Rating

- >> 0 – Materials that in themselves are normally stable, even under fire conditions.

#### Health Hazards:

- >> Dizziness, incoordination, anesthesia; may be accompanied by nausea and liver damage. Kidney damage also occurs, often producing decrease or stopping of urinary output. (USCG, 1999)

#### ERG 2024, Guide 151 (Carbon tetrachloride)

- >> Highly toxic, may be fatal if inhaled, ingested or absorbed through skin.
- >> Avoid any skin contact.
- >> Fire may produce irritating, corrosive and/or toxic gases.
- >> Runoff from fire control or dilution water may be corrosive and/or toxic and cause environmental contamination.
- >> Special Hazards of Combustion Products: Forms poisonous phosgene gas when exposed to open flames.
- >> Behavior in Fire: Decomposes to form chlorine and phosgene (USCG, 1999)

#### ERG 2024, Guide 151 (Carbon tetrachloride)

- >> Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- >> Containers may explode when heated.
- >> Runoff may pollute waterways.
- >> Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.

### 3. Composition/Information On Ingredients

**Chemical name** : Carbon tetrachloride

**CAS Number** : 56-23-5

**Molecular Formula** : CCl<sub>4</sub>

**Molecular Weight** : 153.8000 g/mol

### 4. First Aid Measures

#### First Aid:

- >> EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.
- >> SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.
- >> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.
- >> INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the

victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

- >> OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

#### **ERG 2024, Guide 151 (Carbon tetrachloride)**

- >> General First Aid:
- >> Call 911 or emergency medical service.
- >> Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and avoid contamination.
- >> Move victim to fresh air if it can be done safely.
- >> Administer oxygen if breathing is difficult.
- >> If victim is not breathing:
  - >> DO NOT perform mouth-to-mouth resuscitation; the victim may have ingested or inhaled the substance.
  - >> If equipped and pulse detected, wash face and mouth, then give artificial respiration using a proper respiratory medical device (bag-valve mask, pocket mask equipped with a one-way valve or other device).
  - >> If no pulse detected or no respiratory medical device available, provide continuous compressions. Conduct a pulse check every two minutes or monitor for any signs of spontaneous respirations.
- >> Remove and isolate contaminated clothing and shoes.
- >> For minor skin contact, avoid spreading material on unaffected skin.
- >> In case of contact with substance, remove immediately by flushing skin or eyes with running water for at least 20 minutes.
- >> For severe burns, immediate medical attention is required.
- >> Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed.
- >> Keep victim calm and warm.
- >> Keep victim under observation.
- >> For further assistance, contact your local Poison Control Center.
- >> Note: Basic Life Support (BLS) and Advanced Life Support (ALS) should be done by trained professionals.
- >> In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the "ERAP" section.

#### **First Aid Measures**

##### **Inhalation First Aid**

- >> Remove immediately from exposure. Fresh air, rest. Artificial respiration may be needed. Refer immediately for medical attention.

##### **Skin First Aid**

- >> Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer immediately for medical attention.

##### **Eye First Aid**

- >> First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

##### **Ingestion First Aid**

- >> Rinse mouth. Refer immediately for medical attention.

## **5. Fire Fighting Measures**

- >> Excerpt from ERG Guide 151 [Substances – Toxic (Non-Combustible)]:
- >> SMALL FIRE: Dry chemical, CO2 or water spray.

- >> LARGE FIRE: Water spray, fog or regular foam. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal. Avoid aiming straight or solid streams directly onto the product.
- >> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)
- >> In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep drums, etc., cool by spraying with water.

## 6. Accidental Release Measures

### Isolation and Evacuation:

Isolation and evacuation measures to take when a large amount of this chemical is accidentally released in an emergency.

- >> Excerpt from ERG Guide 151 [Substances – Toxic (Non-Combustible)]:
- >> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- >> SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.
- >> FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

### Evacuation: ERG 2024, Guide 151 (Carbon tetrachloride)

- >> Immediate precautionary measure
- >> Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- >> Spill
- >> For non-highlighted materials: increase the immediate precautionary measure distance, in the downwind direction, as necessary.
- >> Fire
- >> If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

### Spillage Disposal:

Methods for containment and safety measures to protect workers dealing with a spillage of this chemical.

- >> Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in covered containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

### Accidental Release Measures

#### Public Safety: ERG 2024, Guide 151 (Carbon tetrachloride)

- >> CALL 911. Then call emergency response telephone number on shipping paper. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- >> Keep unauthorized personnel away.
- >> Stay upwind, uphill and/or upstream.

#### Spill or Leak: ERG 2024, Guide 151 (Carbon tetrachloride)

- >> Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- >> Stop leak if you can do it without risk.
- >> Prevent entry into waterways, sewers, basements or confined areas.
- >> Cover with plastic sheet to prevent spreading.
- >> Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

- >> DO NOT GET WATER INSIDE CONTAINERS.
- >> For solids, prevent dust cloud and avoid inhalation of dust.

## 7. Handling And Storage

### Safe Storage:

- >> Well closed. Cool. Separated from food and feedstuffs and metals. See Chemical Dangers. Ventilation along the floor. Store in an area without drain or sewer access.

### Storage Conditions:

- >> Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

## 8. Exposure Control/ Personal Protection

### REL-STEL (Short Term Exposure Limit)

- >> 2 ppm (12.6 mg/m<sup>3</sup>) [60 minutes]
- >> Ca ST 2 ppm (12.6 mg/m<sup>3</sup>) [60-minute] See Appendix A
- >> 10.0 [ppm], Ceiling(OSHA) = 25 ppm (200 ppm for 5-min peak in any 4 hrs.)

### PEL-TWA (8-Hour Time Weighted Average)

- >> 10 ppm

### PEL-C (Ceiling)

- >> 25 ppm [5 min in any 4 hrs]; 200 ppm (Peak)
- >> 5.0 [ppm]

### TLV-STEL

- >> 10.0 [ppm]
- >> 5 ppm as TWA; 10 ppm as STEL; (skin); A2 (suspected human carcinogen).

### TLV-TWA (Time Weighted Average)

- >> 5 ppm [1990]

### TLV-STEL (Short Term Exposure Limit)

- >> 10 ppm [1990]

### EU-OEL

- >> 6.4 mg/m

### MAK (Maximale Arbeitsplatz Konzentration)

- >> 3.2 mg/m

### Emergency Response: ERG 2024, Guide 151 (Carbon tetrachloride)

- >> Small Fire
- >> Dry chemical, CO<sub>2</sub> or water spray.
- >> Large Fire
- >> Water spray, fog or regular foam.
- >> If it can be done safely, move undamaged containers away from the area around the fire.
- >> Dike runoff from fire control for later disposal.
- >> Avoid aiming straight or solid streams directly onto the product.
- >> Fire Involving Tanks, Rail Tank Cars or Highway Tanks

- >> Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles.
- >> Do not get water inside containers.
- >> Cool containers with flooding quantities of water until well after fire is out.
- >> Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- >> ALWAYS stay away from tanks in direct contact with flames.
- >> For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- >> ERPG-1: 20 ppm – one hour exposure limit: 1 = mild transient health effects or objectionable odor [AIHA]
- >> ERPG-2: 100 ppm – one hour exposure limit: 2 = impaired ability to take protective action [AIHA]
- >> ERPG-3: 750 ppm – one hour exposure limit: 3 = life threatening health effects [AIHA]

### **Inhalation Risk:**

- >> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20 °C.

### **Effects of Short Term Exposure:**

- >> The substance is irritating to the eyes. The substance may cause effects on the liver, kidneys and central nervous system. This may result in unconsciousness. Medical observation is indicated.

### **Effects of Long Term Exposure:**

- >> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This may result in impaired functions of organs and cirrhosis. This substance is possibly carcinogenic to humans.

### **Acceptable Daily Intakes:**

An estimate of the amount of a chemical in food or drinking water that can be consumed daily over a lifetime without presenting an appreciable risk to health. It is usually expressed as milligrams of the substance per kilogram of body weight per day and applies to chemicals such as food additives, pesticide residues and veterinary drugs.

- >> 0.025 mg/l /Adjusted acceptable daily intake (AADI)/

### **Exposure Prevention**

- >> AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

### **Inhalation Prevention**

- >> Use ventilation, local exhaust or breathing protection.

### **Skin Prevention**

- >> Protective gloves. Protective clothing.

### **Eye Prevention**

- >> Wear face shield or eye protection in combination with breathing protection.

### **Ingestion Prevention**

- >> Do not eat, drink, or smoke during work.

### **Exposure Control and Personal Protection**

#### **Protective Clothing: ERG 2024, Guide 151 (Carbon tetrachloride)**

- >> Wear positive pressure self-contained breathing apparatus (SCBA).
- >> Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE.
- >> Structural firefighters' protective clothing provides thermal protection but only limited chemical protection.

#### **Maximum Allowable Concentration (MAK)**

- >> 0.5 [ppm]

## **9. Physical And Chemical Properties**

**Molecular Weight:**

>> 153.8

**Exact Mass:**

>> 153.872461

**Physical Description:**

>> Carbon tetrachloride appears as a clear colorless liquid with a characteristic odor. Denser than water (13.2 lb / gal) and insoluble in water. Noncombustible. May cause illness by inhalation, skin absorption and/or ingestion. Used as a solvent, in the manufacture of other chemicals, as an agricultural fumigant, and for many other uses.

>> COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.

**Color/Form:**

>> Liquid

**Odor:**

>> Sweet

**Boiling Point:**

>> 170.1 °F at 760 mmHg (NTP, 1992)

>> 76.7 °C

**Melting Point:**

>> -9 °F (NTP, 1992)

>> -23 °C

**Solubility:**

>> less than 1 mg/mL at 70 °F (NTP, 1992)

>> Solubility in water, mg/l at 20 °C: 800 (very slightly soluble)

**Density:**

>> 1.59 at 68 °F (USCG, 1999) – Denser than water; will sink

>> Relative density (water = 1): 1.59 (20 °C)

**Vapor Density:**

>> 5.3 (NTP, 1992) – Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 5.3

**Vapor Pressure:**

>> 91 mmHg at 68 °F ; 113 mmHg at 77 °F (NTP, 1992)

>> Vapor pressure, kPa at 20 °C: 12.2

**LogP:**

>> log Kow = 2.83

>> 2.64

**Stability/Shelf Life:**

>> Stable under recommended storage conditions.

**Autoignition Temperature:**

>> Not flammable (USCG, 1999)

**Decomposition:**

>> Hazardous decomposition products formed under fire conditions – Carbon oxides, hydrogen chloride gas.

**Viscosity:**

>> 2.03X10<sup>-3</sup> Pa.s at 250.00 K

>> 2.03 mPa\*s at -23 °C

**Corrosivity:**

The ability of a chemical to damage or destroy other substances when it comes into contact.

>> Liquid carbon tetrachloride attacks some forms of plastics, rubber, and coatings.

**Heat of Combustion:**

>> 37.3 kg cal/g mol wt at 20 °C

**Heat of Vaporization:**

>> 3.45X10<sup>7</sup> J/kmol at 250–33 K

**Surface Tension:**

>> 3.23X10<sup>-2</sup> N/m at 25.33 K

**Ionization Potential:**

>> 11.47 eV

**Odor Threshold:**

>> Odor Threshold Low: 140.0 [mmHg]

>> Odor Threshold High: 584.0 [mmHg]

>> Detection odor threshold from AIHA (mean = 252 ppm)

**Refractive Index:**

>> Index of refraction: 1.4601 at 20 °C/D

**Relative Evaporation Rate:**

The rate at which a material will vaporize (evaporate, change from liquid to vapor), compared to the rate of vaporization of a specific known material.

>> Evaporation rate: 12.8 (butyl acetate = 1)

## 10. Stability And Reactivity

>> Insoluble in water.

**CSL No**

>> CSL00060

**Reactants/Reagents**

>> ALUMINUM + CARBON TETRACHLORIDE + MAGNESIUM + CHLOROFORM

**Warning Message**

>> Potentially explosive in the presence of Mg or Al powder

**GHS Category**

>> Explosive

**Reference Source**

>> User-Reported

**Modified Date**

>> 7/8/18

**Create Date**

>> 6/27/17

## 11. Toxicological Information

**Toxicity Summary:**

>> IDENTIFICATION AND USE: Carbon tetrachloride is a colorless, heavy liquid. It is used in refrigerants, metal degreasing, in chlorinating organic compounds, in the production of semiconductors, and as a solvent (fats, oils, rubber, etc). It was formerly used as anthelmintic. HUMAN STUDIES: Potential symptoms of overexposure are CNS depression, drowsiness, dizziness, incoordination, nausea, and vomiting as well as liver and kidney injury. Direct contact may cause skin and eye irritation, and dermatitis through defatting action. Liver damage appears after 24 hrs or more. Kidney damage is evident often only 2 to 3 weeks following the poisoning. Three case reports describe the occurrence of liver tumors associated

with cirrhosis in people who had been exposed to carbon tetrachloride. Covalent binding to macromolecules and lipid peroxidation occur via metabolic intermediates of carbon tetrachloride. Carbon tetrachloride did not demonstrate the DNA damaging activity in a short-term in vitro system which utilized human lymphocytes. ANIMAL STUDIES: The liver and kidney are target organs for carbon tetrachloride toxicity. The severity of the effects on the liver depends on a number of factors such as species susceptibility, route and mode of exposure, diet or co-exposure to other compounds, in particular ethanol. Furthermore, pretreatment with various compounds, such as phenobarbital and vitamin A, enhances hepatotoxicity, while other compounds, such as vitamin E, reduce the hepatotoxic action of carbon tetrachloride. Moderate irritation after dermal application was seen and there was a mild reaction after application into the rabbit eye. Increased fetal mortality was observed in pregnant mice given single doses of 150 mg carbon tetrachloride per animal during the last part of pregnancy. Cause of death was failure of peripheral circulation, mainly due to fetal liver damage. Moreover, circulatory disturbances and necroses were found in the placentas, which probably also contributed to the death of the fetuses. Carbon tetrachloride was not teratogenic to rats exposed orally, subcutaneously, or via inhalation. Carbon tetrachloride produced testicular toxicity in the rat at dose levels where hepatic damage is evident. After 25 wk of inhalation exposure to 200 and 400 ppm, male rats show germ cell degeneration in the testes along with liver toxicity and a high mortality rate. Testicular damage was also observed in rats when carbon tetrachloride was administered ip at a dose level of 1.5 mg/kg. A single injection caused testicular atrophy, a decrease in testes and seminal vesicle weights, and histological evidence of abnormal spermatogenesis. Carbon tetrachloride may have estrogenic properties that can alter male fertility. Its estrogenicity is evidenced by (a) inhibition of hepatic microsomal hydroxylation of estrogens in immature female rats, (b) potentiation of the uterotrophic responses of estrogens, and (c) increased estrogen uterine uptake. Carbon tetrachloride was not mutagenic in bacteria. It was mutagenic in yeast at almost lethal doses. It did not induce chromosomal damage in cultured rat liver epithelial cells and did not induce unscheduled DNA synthesis in the hepatocytes of rats exposed in vivo. Carbon tetrachloride induced hepatomas and hepatocellular carcinomas in mice and rats. The doses inducing hepatic tumors were higher than those inducing cell toxicity. ECOTOXICITY STUDIES: Carbon tetrachloride is considerably more toxic to the embryo-larval stages of several species of fish and amphibians than it is to the adults.

**USGS Health-Based Screening Levels for Evaluating Water-Quality:**

This section provides the USGS Health-Based Screening Levels for Evaluating Water-Quality data.

**Chemical**

>> Tetrachloromethane

**USGS Parameter Code**

>> 32102

**MCL (Maximum Contaminant Levels)[µg/L]**

>> 5

**Benchmark Remarks**

>> Synonym: Carbon tetrachloride

**Reference**

>> Smith, C.D. and Nowell, L.H., 2024. Health-Based Screening Levels for evaluating water-quality data (3rd ed.). DOI:10.5066/F71C1TWP

**Evidence for Carcinogenicity:**

Evidence that this chemical does or may cause cancer. The information here is collected from various sources by the Hazardous Substances Data Bank (HSDB).

>> Under the Guidelines for Carcinogen Risk Assessment (U.S. EPA, 2005a), carbon tetrachloride is "likely to be carcinogenic to humans" based on: (1) inadequate evidence of carcinogenicity in humans and (2) sufficient evidence in animals by oral and inhalation exposure, i.e., hepatic tumors in multiple species (rat, mouse, and hamster) and pheochromocytomas (adrenal gland tumors) in mice.

**Carcinogen Classification:**

This section provides the International Agency for Research on Cancer (IARC) Carcinogenic Classification and related monograph links. In the IARC Carcinogenic classification, chemicals are categorized into four groups: Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), Group 2B (possibly carcinogenic to humans), and Group 3 (not classifiable as to its carcinogenicity to humans).

**IARC Carcinogenic Agent**

>> Carbon tetrachloride

**IARC Carcinogenic Classes**

>> Group 2B: Possibly carcinogenic to humans

**IARC Monographs**

- >> Volume 20: (1979) Some Halogenated Hydrocarbons
- >> Volume Sup 7: Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42, 1987; 440 pages; ISBN 92-832-1411-0 (out of print)
- >> Volume 71: (1999) Re-evaluation of Some Organic Chemicals, Hydrazine and Hydrogen Peroxide (Part 1, Part 2, Part 3)
- >> 2B, possibly carcinogenic to humans. (L135)

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**Health Effects:**

- >> High exposure to carbon tetrachloride can cause liver, kidney, and central nervous system damage. Single cell necrosis, which is evident after 5h to 6h after dosing, progresses to maximal centrilobular necrosis within 24h to 48h. Cellular regeneration is maximal 36h to 48h after dosing. The rate and extent of tissue repair are important determinants of the ultimate outcome of liver injury. In severe cases, coma and even death may occur. (T10, L129)

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**Exposure Routes:**

- >> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
- >> inhalation, skin absorption, ingestion, skin and/or eye contact

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**Inhalation Exposure**

- >> Headache. Nausea. Vomiting. Dizziness. Drowsiness.

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**Skin Exposure**

- >> MAY BE ABSORBED! Redness. Further see Inhalation.

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**Eye Exposure**

- >> Redness. Pain.

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**Ingestion Exposure**

- >> Burning sensation in the stomach. Abdominal pain. Diarrhoea. Further see Inhalation.
- >> irritation eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen]

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**Target Organs:**

Organs that are affected by exposure to this chemical. Information in this section reflects human data unless otherwise noted.

- >> Cancer, Hepatic (Liver), Neurological (Nervous System), Renal (Urinary System or Kidneys)
- >> Hepatic

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**Cancer Sites:**

The site in which cancer develops due to exposure to this compound. Cancers are casually referred to based on their primary sites (e.g., skin, lung, breasts, prostate, colon and rectum).

- >> Endocrine
- >> Hepatic
- >> [in animals: liver cancer]

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**Adverse Effects:**

An adverse effect is an undesired harmful effect resulting from a medical treatment or other intervention.

- >> Neurotoxin – Acute solvent syndrome
- >> Occupational hepatotoxin – Primary hepatotoxins: the toxic effect to the liver is the principal adverse effect of the chemical.
- >> Nephrotoxin – The chemical is potentially toxic to the kidneys in the occupational setting.
- >> IARC Carcinogen – Class 3: Chemicals are not classifiable by the International Agency for Research on Cancer.
- >> NTP Carcinogen – Reasonably anticipated to be a human carcinogen.
- >> ACGIH Carcinogen – Suspected Human.

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**Toxicity Data:**

- >> LC50 (rat) = 8,000 ppm/4 hr

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**Minimum Risk Level:**

The minimal risk level (MRL) is an estimate of the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health

>> Intermediate Inhalation: 0.03 ppm (L134) Chronic Inhalation: 0.03 ppm (L134) Acute Oral: 0.02 mg/kg/day (L134)  
Intermediate Oral: 0.007 mg/kg/day (L134)

#### Interactions:

>> Concurrent treatment of mammals with carbon tetrachloride and ... DDT ... increases susceptibility (approx 10 fold) to carbon tetrachloride toxicity.

#### Antidote and Emergency Treatment:

>> Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Carbon tetrachloride and related compounds/

#### Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ Exposure to carbon tetrachloride at 10 or 11 ppm for 180 min produced no effect on liver or kidney function based on urinary urobilinogen, serum glutamic oxaloacetic transaminase and 15 min phenolsulfonaphthalein assays. However, exposure to 49 ppm for 70 min produced an effect on liver function shown by a reduction of serum iron 1-2 days later in 2/4 subjects.

#### Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Oxidative stress is involved in the development of anorexia. In the present study, we examined the possible involvement of anorexia in oxygen radical-induced hepatitis. A low dose of carbon tetrachloride (1 mL/kg of a 1:1 solution with olive oil) was orally administered to rats with and without food restriction. In rats with food restriction, carbon tetrachloride treatment induced hepatitis and reduced the body weight gain. In contrast, carbon tetrachloride treatment did not induce hepatitis in rats without food restriction, but the body weight was decreased. In these rats, the loss of body weight was accompanied by a decrease in food intake. The present results indicate that the administration of a low dose of carbon tetrachloride to rats without food restriction induced anorexia independently of hepatitis.

#### Non-Human Toxicity Values:

>> LD50 Rat oral 2350 mg/kg

#### National Toxicology Program Studies:

Reports from the National Toxicology Program, an interagency program supported by three government agencies (NIH, FDA, and CDC) within the Department of Health and Human Services. This program plays a critical role in generating, interpreting, and sharing toxicological information about chemicals of public health concerns.

>> Carbon tetrachloride ... was selected for immunotoxicity studies /using female B6C3F1 mice/. Female B6C3F1 mice ... were administered carbon tetrachloride daily for 7 days by oral gavage. ... In completing the range-finding protocol, two studies were conducted. In both studies, three dose levels, 100, 200 and 1000 mg/kg, of carbon tetrachloride were administered. The results of the carbon tetrachloride range-finding studies demonstrate that, in the female B6C3F1 mouse, exposure to carbon tetrachloride, administered by oral gavage for 7 days at doses of 100, 500 or 1000 mg/kg, was not overly toxic in that all of the animals survived the exposure period. Carbon tetrachloride exposure did not affect body weight or body weight gain. Furthermore, there was no effect on hematological parameters or organ weights with the exception of the liver which increased in weight dose dependently. The 7 day exposure period did not result in an altered spleen IgM plaque-forming cell response to the T-dependent antigen, sheep erythrocytes. However, in the animals receiving the 500 and 1000 mg/kg dose levels of carbon tetrachloride, the mixed leukocyte response was decreased 35% and 29%, respectively. Based on the toxicological and immunological results of these range-finding studies, doses of 50, 100 and 500 mg/kg will be used in the carbon tetrachloride 14 day protocol study.

#### TSCA Test Submissions:

Under the Toxic Substances Control Act (TSCA), EPA has broad authority to issue regulations designed to require manufacturers (including importers) or processors to test chemical substances and mixtures for health and environmental effects. This section provides information on test reports submitted for this chemical under TSCA.

>> Subchronic inhalation toxicity was evaluated with male albino SPF Wistar rats (10/group) exposed to carbon tetrachloride (CTC) for 6 hrs/day, 5 days/week for 4 weeks using different exposure profiles. Animals were exposed to nominal concentrations of 0, 63 or 80 ppm either continuously for 6 hrs or in two 3-hr periods with an interruption of 1.5 hrs. Also, animals were exposed to 63 ppm continuously for 6 hrs/day with 8 superimposed 5-minute peak exposures of 378 ppm or exposed to 80 ppm for two 3-hr periods with 8 superimposed 5-minute peak exposures. Compared to controls, animals exposed to CTC exhibited statistically significantly increased activities of serum glutamic oxalacetic and pyruvic transaminases (increased further by interruption of exposure), decreased activity of a number of liver microsomal enzymes and quantity of microsomal proteins and increased relative liver and lung weights (no differences between exposure profiles). There were no significant differences between animals exposed or not

exposed to CTC in body weight. Histopathological changes were observed in the livers of exposed animals consisting of hydropic degeneration of hepatocytes (including the occurrence of "balloon Cells") and fat accumulation in hepatocytes. These changes were more severe in animals given interrupted exposure versus continuous exposure and more severe at the high-dose level than the low-dose level.

#### Populations at Special Risk:

>> Individuals who are habitual users of barbituates.

## 12. Ecological Information

#### Resident Soil (mg/kg)

>> 6.50e-01

#### Industrial Soil (mg/kg)

>> 2.90e+00

#### Resident Air (ug/m3)

>> 4.70e-01

#### Industrial Air (ug/m3)

>> 2.00e+00

#### Tapwater (ug/L)

>> 4.60e-01

#### MCL (ug/L)

>> 5.00e+00

#### Risk-based SSL (mg/kg)

>> 1.80e-04

#### MCL-based SSL (mg/kg)

>> 1.90e-03

#### Oral Slope Factor (mg/kg-day)-1

>> 7.00e-02

#### Inhalation Unit Risk (ug/m3)-1

>> 6e-06

#### Chronic Oral Reference Dose (mg/kg-day)

>> 4.00e-03

#### Chronic Inhalation Reference Concentration (mg/m3)

>> 1.00e-01

#### Volatile

>> Volatile

#### Mutagen

>> Mutagen

#### Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

#### Soil Saturation Concentration (mg/kg)

>> 4.58e+02

#### ICSC Environmental Data:

>> It is strongly advised not to let the chemical enter into the environment. The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment because of its impact on the ozone layer.

### Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

- >> SOIL: Carbon tetrachloride gas concentrations were <5 ppbv at depths of 30 to 70 cm in cover soil at the Case Passerini landfill site, Florence, Italy. Concentrations in two on-site wells were 5068 and 901 ppbv(1).

### Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

- >> Carbon tetrachloride was detected in fish (Conger conger, *Gadus morhua*, *Pollachius birens*, *Scylliorhinus canicula*, *Trisopterus luscus*) collected from Port Erin, Ireland, at 3–209 ng/g dry weight. The compound was also detected in molluscs (*Baccinum undatum*, *Modiolus modiolus*, *Pecten maximus*) collected from Port Erin, Ireland, at 2–114 ng/g dry weight(1).

## 13. Disposal Considerations

### Spillage Disposal

- >> Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in covered containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

### Disposal Methods

- >> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U211 and D019, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.
- >> Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber; Contaminated packaging: Dispose of as unused product.
- >> SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.
- >> Carbon tetrachloride is a waste chemical stream constituent which may be subjected to ultimate disposal by controlled incineration. Preferably after mixing with another combustible fuel; care must be exercised to assure complete combustion to prevent the formation of phosgene; an acid scrubber is necessary to remove the halo acids produced.
- >> For more Disposal Methods (Complete) data for Carbon tetrachloride (12 total), please visit the HSDB record page.

## 14. Transport Information

### DOT

Carbon tetrachloride

6.1

UN Pack Group: II

Reportable Quantity of 10 lb or 4

### IATA

Carbon tetrachloride

6.1,

UN Pack Group: II

## 15. Regulatory Information

### Federal Drinking Water Standards:

Federal drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

- >> Maximum contaminant levels (MCL) for organic contaminants apply to community and non-transient, non-community water systems: carbon tetrachloride, MCL 0.005 mg/L.

### Federal Drinking Water Guidelines:

Federal drinking water guidelines (e.g. maximum containment level (MCL)) for this chemical. In general, these guidelines are recommendations and not legally enforceable.

- >> The maximum contaminant level goal (MCLG) for the following organic contaminant is zero mg/L: carbon tetrachloride.

### State Drinking Water Standards:

State drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

- >> (CA) CALIFORNIA 0.5 ug/L

### Clean Water Act Requirements:

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under CWA, the U.S. Environmental Protection Agency (EPA) developed the Toxic Pollutant List (40 CFR Part 401.15) and the Priority Pollutant List (40 CFR Part 423, Appendix A). These lists are to be used by EPA and States to develop the Effluent Guidelines regulations and ensure water quality criteria and standards.

- >> Carbon tetrachloride is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

### Regulatory Information

#### The Australian Inventory of Industrial Chemicals

- >> Chemical: Methane, tetrachloro-

#### REACH Registered Substance

- >> Status: Active Update: 02-02-2023 <https://echa.europa.eu/registration-dossier/-/registered-dossier/14940>

#### New Zealand EPA Inventory of Chemical Status

- >> Carbon tetrachloride: HSNO Approval: HSR002930 Approved with controls

## 16. Other Information

### Toxic Combustion Products:

Toxic products (e.g., gases and vapors) produced from the combustion of this chemical.

- >> May form phosgene when used to put out electrical fires.

### Other Safety Information

#### Chemical Assessment

- >> IMAP assessments – Methane, tetrachloro-: Environment tier II assessment
- >> IMAP assessments – Methane, tetrachloro-: Human health tier I assessment

"The information provided is believed to be accurate but is not comprehensive and should be used as a reference. It reflects our current knowledge and is intended for safety guidance related to the product. This document does not constitute a warranty of

the product's properties. lonz is not responsible for any damages resulting from handling or contact with the product incorrectly."