

# MATERIAL SAFETY DATA SHEET

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## 1. SUBSTANCE AND SOURCE IDENTIFICATION

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National Institute of Standards and Technology  
Standard Reference Materials Program  
100 Bureau Drive, Stop 2300  
Gaithersburg, Maryland 20899-2300

SRM Number: 3010  
MSDS Number: 3010  
SRM Name: Tetrachloroethene  
(Tetrachloroethylene) in Methanol

Date of Issue: 03 April 2013

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**Description:** This Standard Reference Material (SRM) is a gravimetrically prepared single-compound solution (tetrachloroethene [tetrachloroethylene]) in methanol intended primarily for the calibration of instrumentation and validation of methods for volatile organic compound (VOC) determinations. Because of its miscibility with water, this SRM can also be used to fortify aqueous samples with known amounts of the VOC. A unit of SRM 3010 consists of two 5 mL sealed borosilicate glass ampoules of a gravimetrically prepared solution of tetrachloroethene in methanol. Approximately 2.5 mL of this SRM mixture is supplied in each 5 mL glass ampoule.

**Substance:** Tetrachloroethene in methanol.

**Other Designations:**

Methanol (methyl alcohol; methyl hydroxide; wood alcohol; wood spirit)

Tetrachloroethene (tetrachloroethylene; 1,1,2,2-tetrachloroethylene; perchloroethylene; PCE; PERC)

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## 2. HAZARDS IDENTIFICATION

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**NFPA Ratings (Scale 0–4):** Health = 2                      Fire = 3                      Reactivity = 0

**NOTE:** This tetrachloroethene in methanol solution has not been tested as a whole. The health and physical hazard information are for the individual components, tetrachloroethene and methanol. The actual effects of the solution may differ from the individual components.

**Major Health Hazards:** Skin, eye, and/or respiratory tract irritation, central nervous system depression, blood disorders, liver damage, aspiration hazard, and nerve damage. Tetrachloroethene is a known cancer hazard (in humans).

**Physical Hazards:** Flammable liquid and vapor. Vapor may cause flash fire. Electrostatic charges may be generated by flow or agitation.

**Potential Health Effects (Acute and Chronic)**

**Inhalation:** Methanol may cause irritation, cough, ringing in the ears, constipation, headache, drowsiness, dizziness, tingling sensation, pain in extremities, tremors, loss of coordination, blood disorders, and nerve damage. Tetrachloroethene can cause irritation, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, mood swings, loss of coordination, blurred vision, lung congestion, kidney damage, liver damage, and cancer.

**Skin Contact:** Methanol can cause irritation, absorption may occur, headache, drowsiness, dizziness, loss of coordination, and blood disorders. Tetrachloroethene can cause irritation to the skin (possibly severe).

**Eye Contact:** Methanol and tetrachloroethene vapors may cause irritation and eye damage. Repeated or prolonged contact may cause conjunctivitis.

**Ingestion:** Ingestion of methanol may result in mild and transient inebriation and subsequent drowsiness. Liver, kidney, heart, stomach, intestine and pancreatic damage may also occur. Death may occur due to respiratory failure. As little as 15 mL has caused blindness; the usual fatal dose is 60 mL to 240 mL. Tetrachloroethene can cause the same effects reported in short term inhalation.

**Listed as a Carcinogen/Potential Carcinogen**

In the National Toxicology Program (NTP) Report on Carcinogens  
In the International Agency for Research on Cancer (IARC) Monographs  
By the Occupational Safety and Health Administration (OSHA)

Yes	No
<u>X<sup>(a)</sup></u>	<u>      </u>
<u>X<sup>(b)</sup></u>	<u>      </u>
<u>      </u>	<u>  X  </u>

<sup>(a)</sup>NTP lists tetrachloroethene as reasonably anticipated to be a human carcinogen.

<sup>(b)</sup>IARC lists tetrachloroethene as Group 2A (probably carcinogenic to humans).

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**3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS**

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Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration <sup>(a)</sup> (%)
Methanol	67-56-1	200-659-6	99
Tetrachloroethene	127-18-4	204-825-9	1

<sup>(a)</sup>Hazardous components 1 % or greater; carcinogens 0.1 % or greater are listed in compliance with OSHA 29 CFR 1910.1200.

**Component:** Methanol

**EC Classification:** T, F

**EC Risk (R No.):** 11, 23/24/25, 39/23/24/25

**EC Safety (S No.):** 7, 16, 36/37, 45

**Component:** Tetrachloroethene

**EC Classification:** Xn, N

**EC Risk (R No.):** 40, 51/53

**EC Safety (S No.):** 23, 36/37, 61

**EC Risk/Safety Phrases:** See Section 15, "Regulatory Information".

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**4. FIRST AID MEASURES**

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**Inhalation:** If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration or oxygen by qualified personnel. Seek medical attention if needed.

**Eye Contact:** Immediately flush eyes with copious amounts of water for at least 15 minutes.

**Skin Contact:** Wash exposed skin with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Thoroughly clean and dry contaminated clothing and shoes before reuse.

**Ingestion:** Ingestion of this material is not likely under normal conditions of use. Potential aspiration hazard if ingested. If swallowed, seek medical attention.

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**5. FIRE FIGHTING MEASURES**

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**Fire and Explosion Hazards:** Severe fire hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

**Extinguishing Media:** Alcohol-resistant foam, carbon dioxide, regular dry chemical, water.

**Fire Fighting:** Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

**Note:** The data listed below is for methanol.

**Flash Point (°C):** 11 (52 °F)

**Method Used:** Closed Cup

**Autoignition Temp. (°C):** 385 (725 °F)

**Flammability Limits in Air**

**UPPER (Volume %):** 36

**LOWER (Volume %):** 6

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## 6. ACCIDENTAL RELEASE MEASURES

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**Occupational Release:** Remove sources of ignition. Do not touch spilled material. Absorb small spills with sand or other non-combustible material. Collect spilled material in appropriate container for proper disposal.

**Disposal:** Refer to Section 13, "Disposal Considerations".

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## 7. HANDLING AND STORAGE

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**Storage:** Store and handle in accordance with all current regulations and standards. Sealed ampoules should be stored in the dark at temperatures between 10 °C and 30 °C. Grounding and bonding required. Keep separated from incompatible substances. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106.

**Safe Handling Precautions:** See Section 8, "Exposure Controls and Personal Protection".

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## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

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### Exposure Limits

**Component:** Methanol

OSHA (PEL): 200 ppm, 260 mg/m<sup>3</sup> (TWA)  
ACGIH (TLV): 200 ppm (TWA); 250 ppm (STEL);  
Skin – potential significant contribution to overall exposure by the cutaneous route.  
NIOSH (REL): 200 ppm, 260 mg/m<sup>3</sup> (TWA); 250 ppm, 325 mg/m<sup>3</sup> (STEL); 6000 ppm (IDLH);  
Potential for dermal absorption.

**Component:** Tetrachloroethene

OSHA (PEL): 100 ppm (TWA); 200 ppm (Ceiling)  
ACGIH (TLV): 25 ppm (TWA); 100 ppm (STEL); 150 ppm (IDLH)

**Ventilation:** Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

**Respirator:** If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29 CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

**Eye Protection:** Wear safety goggles. An eyewash station and drench shower should be readily available near the handling and use areas.

**Personal Protection:** In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for the solution are not available. For SRM solution density information, see the Certificate of Analysis.

Descriptive Properties	Methanol (concentration: 99 %)	Tetrachloroethene (concentration: 1 %)
<b>Molar Mass (g/mol):</b>	32.04	165.83
<b>Molecular Formula:</b>	CH <sub>3</sub> OH	C <sub>2</sub> Cl <sub>4</sub>
<b>Appearance (physical state, color, etc.):</b>	clear, colorless, liquid	clear, colorless, volatile liquid
<b>Odor:</b>	alcohol odor (threshold 100 ppm)	sweet odor (threshold 50 ppm)
<b>Melting point/freezing point:</b>	–94 °C (–137 °F)	–19 °C (–2.2 °F)
<b>Specific Gravity (water = 1):</b>	0.7914	1.6227
<b>Vapor Pressure:</b>	97.25 mmHg at 20 °C	14 mmHg at 20 °C
<b>Vapor Density (air = 1):</b>	1.11	5.83
<b>Viscosity:</b>	0.59 cP at 20 °C	not available
<b>Solubility(ies):</b>	water: soluble  solvent: soluble in ether, benzene, alcohol, acetone, chloroform, ethanol, ketones, organic solvents	water: 0.015 %  solvent: alcohol, ether, benzene, chloroform, oils, hexane

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## 10. STABILITY AND REACTIVITY

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**Stability:**   X   Stable        Unstable

**Conditions to Avoid:** Avoid heat, flames, sparks, and other sources of ignition. Ampoules may rupture or explode if exposed to heat. Keep out of water supplies and sewers. Avoid inhalation of material or combustion by-products. Avoid contact with incompatible materials.

**Incompatible Materials:** Halo carbons, combustible materials, metals, oxidizing materials, halogens, metal carbide, bases, acids, amines, and metal salts.

**Fire/Explosion Information:** See Section 5, "Fire Fighting Measures".

**Hazardous Decomposition:** Phosgene, chlorides, oxides of carbon.

**Hazardous Polymerization:**        Will Occur   X   Will Not Occur

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## 11. TOXICOLOGICAL INFORMATION

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**Route of Entry:**   X   Inhalation   X   Skin   X   Ingestion

**Toxicity Data:** End points listed by Registry of Toxic Effects of Chemical Substances (RTECS).

**Component:** Methanol

Rat, Oral LD50: 5628 mg/kg

Rat, Inhalation LC50: 83.2 mg/L (4 h); 64 000 ppm (4 h)

Rabbit, Skin LD50: 15 800 mg/kg

**Component:** Tetrachloroethene

Rat, Oral LD50: 2629 mg/kg

Rat, Inhalation LC50: 4000 ppm (4 h)

Mouse, Dermal LD50: 2800 mg/kg

**Irritation Data:**

**Component:** Methanol

Rabbit, eyes: 100 mg (24 h), moderate

Rabbit, skin: 20 mg (24 h), moderate

**Component:** Tetrachloroethene

Rabbit, eyes: 500 mg (24 h), mild

Rabbit, skin: 500 mg (24 h), mild

**Health Effects:** See Section 2, "Hazards Identification" for potential health effects.

**Target Organs:** Central nervous system.

**Medical Conditions Aggravated by Exposure:** Allergies and disorders of the blood system, immune system, eye, skin, and kidney.

**Mutagen/Teratogen:** The components of this material have been reviewed and the Registry of Toxic Effects of Chemical Substances (RTECS) publishes the following endpoints.

**Component:** Methanol

Tumorigenic: Rat, Inhalation TCLo: 1000 ppm (2 years)

Mutagenic: Human: 300 mmol/L

Reproductive: Rat, Inhalation TCLo: 2.6 mg/m<sup>3</sup> (pregnant 1 d to 22 d)

Rat, Oral TDLo: 6000 mg/kg (pregnant 17 d to 19 d)

Mouse, Inhalation TCLo: 2000 ppm (7 h, pregnant 6 d to 15 d)

**Component:** Tetrachloroethene

Tumorigenic: Rat, Inhalation TC: 200 ppm (6 h)

Mutagenic: Rat: 500 ppm, 97 µmol/L; Human: 100 mg/L, 2.4 ppm (1 year)

Reproductive: Rat, Inhalation TCLo: 250 ppm (pregnant 6 d to 19 d)

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## 12. ECOLOGICAL INFORMATION

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### Ecotoxicity Data

**Component:** Methanol

Fish Toxicity: Rainbow trout (*Oncorhynchus mykiss*) LC50 (static): 18 mL/L to 20 mL/L (96 h)

**Component:** Tetrachloroethene

Fish Toxicity: Bluegill (*Lepomis macrochirus*) LC50 (static): 11.0 mg/L to 15.0 mg/L (96 h)

Algae Toxicity: *Pseudokirchneriella subcapitata* EC50: >500 mg/L (96 h)

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## 13. DISPOSAL CONSIDERATIONS

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**Waste Disposal:** Dispose in accordance with all applicable federal, state, and local requirements. Subject to disposal regulations: U.S. EPA 40 CFR 262; Hazardous Waste Number(s): U154 (methanol); U210 (tetrachloroethene, 0.7 mg/L regulatory level).

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## 14. TRANSPORTATION INFORMATION

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**U.S. DOT and IATA:** UN1230, Methanol solution, Hazard Class 3 (6.1), Packing Group II, Excepted Qty: Yes, E2.

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## 15. REGULATORY INFORMATION

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### U.S. Regulations

CERCLA Sections 102a/103 (40 CFR 302.4): 5000 lb (2270 kg) final RQ for methanol;

100 lb (45.4 kg) final RQ for tetrachloroethene.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Methanol de minimis concentration 1.0 %;

Tetrachloroethene de minimis concentration 0.1 %.

OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21)

ACUTE HEALTH: Yes

CHRONIC HEALTH: Yes

FIRE: Yes

REACTIVE: No

PRESSURE: No

### State Regulations

California Proposition 65: WARNING! This product contains chemicals known to the state of California to cause reproductive/developmental effects (methanol) and cancer (tetrachloroethene). Keep out of water supplies and sewers.

### Canadian Regulations

WHMIS Information: Not provided for this material.

### European Regulations

**Component:** Methanol

**EC Classification:** F – Highly Flammable, T – Toxic (Concentration  $\geq 20$  %)

**EC Risk Phrases:**

R11 – Highly flammable.

R23/24/25 – Toxic by inhalation, in contact with skin and if swallowed.

R39/23/24/25 – Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.

**EC Safety Phrases:**

S7 – Keep container tightly closed.

S16 – Keep away from sources of ignition – No smoking.

S36/37 – Wear suitable protective clothing and gloves.

S45 – In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**Component:** Tetrachloroethene

**EC Classification:** Xn – Harmful, D – Dangerous for the environment

**EC Risk Phrases:**

R40 – Limited evidence of a carcinogenic effect.

R51/53 – Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**EC Safety Phrases:**

S23 – Do not breathe vapor.

S36/37 – Wear suitable protective clothing and gloves.

S61 – Avoid release to the environment. Refer to special instructions/Safety data sheets.

**National Inventory Status**

**U.S. Inventory (TSCA):** Methanol and 1,2-dichloropropane are listed.

**TSCA 12(b), Export Notification:** Not listed.

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**16. OTHER INFORMATION**

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**Sources:** ChemADVISOR, Inc., MSDS *Methyl Alcohol*, 03 December 2012.

ChemADVISOR, Inc., MSDS *Tetrachloroethylene*, 03 December 2012.

EC; European Chemical Substance Information System (ESIS), *Tetrachloroethylene*, CAS No. 127-18-4; available at <http://esis.jrc.ec.europa.eu/> (accessed Apr 2013).

EC; ESIS, *Methanol*, CAS No. 67-56-1; available at <http://esis.jrc.ec.europa.eu/> (accessed Apr 2013).

**Disclaimer:** Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.