



# Material Safety Data Sheet

## Tetrahydrofuran

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### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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**PRODUCT NAME:** Tetrahydrofuran

**OTHER/GENERIC NAMES:** THF, Tetramethylene oxide, Butylene oxide

**PRODUCT USE:** Solvent

**MANUFACTURER:** Honeywell  
1953 South Harvey Street  
Muskegon, MI 49442

**DISTRIBUTOR:** VWR International  
1310 Goshen Parkway  
West Chester, PA 19380

**FOR MORE INFORMATION CALL:**  
(Monday-Friday, 8:00am-5:00pm)  
1-800-932-5000

**IN CASE OF EMERGENCY CALL:**  
(24 Hours/Day, 7 Days/Week)  
1-800-424-9300 (USA Only)  
**For Transportation Emergencies:**  
1-800-424-9300 (CHEMTREC - Domestic)  
1-613-996-6666(CANUTEC- Canada)

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

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### 2. COMPOSITION/INFORMATION ON INGREDIENTS

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<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>WEIGHT %</u>
Tetrahydrofuran	109-99-9	~100%

This product is not considered to be hazardous according to the criteria specified in 29 CFR 1910.1200 (Hazard Communication Standard) and the Canadian Controlled Product Regulations.

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

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### 3. HAZARDS IDENTIFICATION

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**EMERGENCY OVERVIEW:** This product is a clear, volatile, flammable liquid. Has an ether-like odor. Highly flammable. Vapours may form explosive mixtures with air. May form explosive peroxides. The product causes irritation of eyes, skin and mucous membranes. Harmful by inhalation and if swallowed. Repeated exposure may cause skin dryness or cracking. Causes headache, drowsiness or other effects to the central nervous system. Considered carcinogenic to animals in certain countries. Do not allow product to contact skin, eyes and clothing. Do not breathe vapours.

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#### POTENTIAL HEALTH HAZARDS

**SKIN:** Irritating to skin. Skin absorption may cause toxic effects similar to those described for inhalation. Repeated or extended contact may cause erythema (reddening of the skin) or dermatitis, resulting from a defatting action on tissue.

**EYES:** Irritating to eyes. Symptoms include itching, burning, redness and tearing.

**INHALATION:** Vapours may cause drowsiness and dizziness. May cause irritation of respiratory tract. Symptoms may include nausea, headache and diarrhea. Acute Inhalation may cause lung, liver and kidney damage or coma.

**INGESTION:** Ingestion may cause gastrointestinal disturbances. Symptoms may include nausea, headache and diarrhea. Acute Ingestion may cause abdominal pain, liver and kidney damage or coma.

**DELAYED EFFECTS:** Repeated or prolonged exposure may cause damage to the respiratory tract, lungs, liver and kidney. Considered carcinogenic to animals in certain countries.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Pre-existing liver or kidney dysfunctions, or respiratory disorders may be aggravated by exposure.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

<u>INGREDIENT NAME</u>	<u>NTP STATUS</u>	<u>IARC STATUS</u>	<u>OSHA LIST</u>	<u>ACGIH STATUS</u>
Tetrahydrofuran (109-99-9)	None	None	None	A3 - Confirmed animal carcinogen with unknown relevance to humans

**HMIS Ratings: Health: 2 Fire: 3 Physical Hazard: 1**

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe \* = Chronic hazard

#### 4. FIRST AID MEASURES

**SKIN:** Wash off immediately with soap and plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Obtain medical attention.

**EYES:** Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

**INHALATION:** Move to fresh air in case of accidental inhalation of vapours. If not breathing, give artificial respiration. If breathing is difficult, give oxygen, provided a qualified operator is available. Call a physician immediately.

**INGESTION:** DO NOT induce vomiting. Immediate medical attention is required.



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ADVICE TO PHYSICIAN: Treat symptomatically.

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#### 5. FIRE FIGHTING MEASURES

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##### FLAMMABLE PROPERTIES

FLASH POINT: 6°F (-14°C)  
FLASH POINT METHOD: Closed Cup  
AUTOIGNITION TEMPERATURE: 610°F (321°C)  
UPPER FLAME LIMIT (volume % in air): 11.8  
LOWER FLAME LIMIT (volume % in air): 2  
FLAME PROPAGATION RATE (solids): Not applicable  
OSHA FLAMMABILITY CLASS: Class 1B Flammable Liquid

##### EXTINGUISHING MEDIA:

Use alcohol-resistant foam, carbon dioxide (CO<sub>2</sub>) or dry chemical.

##### UNUSUAL FIRE AND EXPLOSION HAZARDS:

Extremely flammable. Vapours may form explosive mixtures with air. Vapours are heavier than air and may travel along the ground to some distant source of ignition and flash back. May form explosive peroxides.

Hazardous combustion products may include carbon monoxide, carbon dioxide (CO<sub>2</sub>).

##### SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Water may be ineffective. Do not use a solid water stream as it may scatter and spread fire. Suppress (knock down) gases/vapours/mists with a water spray jet. Fire or intense heat may cause violent rupture of packages. Fire-fighters should wear self-contained, NIOSH-approved breathing apparatus and full protective clothing. In the event of fire, cool tanks with water spray. Do not allow run-off from fire fighting to enter drains or water courses.

**NFPA Ratings: Health: 2 Fire: 3 Reactivity: 1**

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

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#### 6. ACCIDENTAL RELEASE MEASURES

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##### IN CASE OF SPILL OR OTHER RELEASE:

Containment Procedures: Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Stop flow of material, if this is without risk.

Cleanup Procedures: Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Shovel into suitable container for disposal. Do not use sparking tools. Do not allow product to enter sewer or waterways.

Evacuation Procedures: Keep unnecessary people away. Isolate area.

Special Procedures: Use personal protective equipment.

**Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.**



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### **Tetrahydrofuran**

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#### **7. HANDLING AND STORAGE**

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**NORMAL HANDLING:** (Always wear recommended personal protective equipment.)

Ensure all equipment is electrically grounded before beginning transfer operations. Use common bonding techniques. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Do not breathe vapours. Keep away from fire, sparks and heated surfaces. May form explosive peroxides -- keep container tightly closed in a dry and well-ventilated place. Minimize exposure to light and air.

**STORAGE RECOMMENDATIONS:**

Keep in a well-ventilated place. Empty containers may retain product residue including flammable or explosive vapours. Do not cut, drill, grind, or weld near full, partially full, or empty product containers. Keep away from heat and sources of ignition. Store away from incompatible substances. Re-open used containers with caution. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in area designed for storage of flammable liquids. Protect from physical damage. Protect from extremes of temperature and direct sunlight and contact with air.

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#### **8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

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**ENGINEERING CONTROLS:**

Provide local and general exhaust ventilation to effectively remove and prevent buildup of any vapours or mists generated from the handling of this product or use product in closed system. Local exhaust ventilation is preferred. Prevent electrostatic charge build-up by using common bonding and grounding techniques.

**PERSONAL PROTECTIVE EQUIPMENT**

**SKIN PROTECTION:**

Wear impervious gloves and flame retardant antistatic protective clothing. Gloves must be inspected prior to use. For leak, spills, or other emergency, use full protective equipment.

**EYE PROTECTION:**

For handling in closed ventilation system, wear safety glasses with side-shields. For leak, spill or other emergency, use chemical goggles and face-shield. Remove contact lenses.

**RESPIRATORY PROTECTION:**

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. For emergency or non-routine operations, wear self-contained breathing apparatus.

**ADDITIONAL RECOMMENDATIONS:**

Provide eyewash stations and quick-drench shower facilities. High standards of skin care and personal hygiene should be exercised at all times.

#### **EXPOSURE GUIDELINES**

**Component Exposure Limits**

**Tetrahydrofuran (109-99-9)**

ACGIH: 50 ppm TWA  
100 ppm STEL  
Skin - potential significant contribution to overall exposure by the cutaneous route



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OSHA (Final):	200 ppm TWA; 590 mg/m <sup>3</sup> TWA
OSHA (Vacated):	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 250 ppm STEL; 735 mg/m <sup>3</sup> STEL
NIOSH:	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 250 ppm STEL; 735 mg/m <sup>3</sup> STEL
Alberta:	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 250 ppm STEL; 737 mg/m <sup>3</sup> STEL
British Columbia:	50 ppm TWA 100 ppm STEL Skin notation
Manitoba:	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 250 ppm STEL; 735 mg/m <sup>3</sup> STEL
New Brunswick:	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 250 ppm STEL; 737 mg/m <sup>3</sup> STEL
Northwest Territories:	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 250 ppm STEL; 735 mg/m <sup>3</sup> STEL
Nova Scotia:	50 ppm TWA 100 ppm STEL Skin - potential significant contribution to overall exposure by the cutaneous route
Nunavut:	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 250 ppm STEL; 735 mg/m <sup>3</sup> STEL
Ontario:	200 ppm TWAEV; 590 mg/m <sup>3</sup> TWAEV 250 ppm STEV; 735 mg/m <sup>3</sup> STEV
Quebec:	100 ppm TWAEV; 300 mg/m <sup>3</sup> TWAEV
Saskatchewan:	590 mg/m <sup>3</sup> TWA; 200 ppm TWA 737 mg/m <sup>3</sup> STEL; 250 ppm STEL
Yukon:	200 ppm TWA; 590 mg/m <sup>3</sup> TWA 250 ppm STEL; 700 mg/m <sup>3</sup> STEL

#### 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>APPEARANCE:</b>	Clear, colorless liquid
<b>PHYSICAL STATE:</b>	Liquid
<b>MOLECULAR WEIGHT:</b>	72.11
<b>CHEMICAL FORMULA:</b>	C <sub>4</sub> H <sub>8</sub> O
<b>ODOR:</b>	Ester-like Threshold: 30 ppm (NIOSH)
<b>SPECIFIC GRAVITY (water = 1.0):</b>	0.888
<b>SOLUBILITY IN WATER (weight %):</b>	100%
<b>pH:</b>	Not applicable
<b>BOILING POINT:</b>	151°F (66°C)
<b>MELTING POINT:</b>	-162°F (-108.5°C)
<b>VAPOUR PRESSURE:</b>	142 mm Hg @ 68°F (20°C)
<b>VAPOUR DENSITY (air = 1.0):</b>	2.5
<b>EVAPORATION RATE:</b>	14.5
<b>% VOLATILES:</b>	100
<b>COMPARED TO:</b>	Butyl Acetate = 1



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### Tetrahydrofuran

**FLASH POINT:** 6°F (-14°C)

(Flash point method and additional flammability data are found in Section 5.)

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#### 10. STABILITY AND REACTIVITY

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**NORMALLY STABLE? (CONDITIONS TO AVOID):**

Stable under recommended storage conditions. May form explosive peroxides. Heat, air, light, and long standing contribute to instability.

Avoid: Heat, flames and sparks. Light. Air. Incompatible products

**INCOMPATIBILITIES:**

Avoid strong oxidizers, acids, bases, nitrogen-fluoride compounds, sulfites and perchlorates. Exposure to light. Exposure to air. Exposure to heat.

**HAZARDOUS DECOMPOSITION PRODUCTS:**

Hazardous decomposition products include carbon monoxide and carbon dioxide (CO<sub>2</sub>).

**HAZARDOUS POLYMERISATION:**

Hazardous polymerization can occur with sources of ignition, or prolonged exposure to air, light or heat.

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#### 11. TOXICOLOGICAL INFORMATION

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Component Analysis - LD50/LC50

**Tetrahydrofuran (109-99-9)**

Rat: LD50 - Route: Inhalation; Dose: 53.9 mg/L/4H

LD50 - Route: Inhalation; Dose: 180 mg/L/1H

LD50 - Route: Oral; Dose: 1650 mg/kg

**IMMEDIATE (ACUTE) EFFECTS:**

The product causes irritation of eyes, skin and mucous membranes. Harmful by inhalation and if swallowed. Dermal absorption is possible. Causes headache, drowsiness or other effects to the central nervous system.

**DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:**

Repeated exposure may cause skin dryness or cracking. Repeated or prolonged exposure may cause damage to the respiratory tract, lungs, liver and kidney.

**OTHER DATA:**

Considered carcinogenic to animals in certain countries. Under the National Toxicology Program (NTP), the U.S. Public Health Service completed a 2-year (lifetime) inhalation study in rats and mice on Tetrahydrofuran (THF) which suggests that THF is a carcinogen in laboratory animals. There is no data linking THF exposure to cancer in humans. The data shows carcinogenic activity in the liver and kidneys of laboratory animals.

**Component Carcinogenicity**

**Tetrahydrofuran (109-99-9)**

ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans



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#### 12. ECOLOGICAL INFORMATION

This material is not expected to be harmful to aquatic life.

##### Component Analysis - Ecotoxicity - Aquatic Toxicity Tetrahydrofuran (109-99-9)

Test & Species		Conditions
96 Hr LC50 fathead minnow	2160 mg/L	flow-through

Does not bioaccumulate. Moderately biodegradable.

#### 13. DISPOSAL CONSIDERATIONS

**WASTE INFORMATION:** EPA Waste Code U213. This product is a D001 ignitable waste in supplied form. Dispose of as special waste in compliance with local and national regulations. Waste codes should be assigned by the user based on the application for which the product was used. Incineration of waste material in an EPA-approved facility is recommended, allowing a solid, inert residue to form.

**OTHER DISPOSAL CONSIDERATIONS:** Observe all Federal, State, and Local Environmental regulations.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

#### 14. TRANSPORT INFORMATION

<b>US DOT PROPER SHIPPING NAME:</b> Tetrahydrofuran	
<b>US DOT HAZARD CLASS:</b> 3	<b>PACKING GROUP:</b> II
<b>US DOT ID NUMBER:</b> UN2056	

<b>TDG PROPER SHIPPING NAME:</b> Tetrahydrofuran	
<b>TDG HAZARD CLASS:</b> 3	<b>PACKING GROUP:</b> II
<b>TDG ID NUMBER:</b> UN2056	

**North American Emergency Response Guide (ERG) Number:** 127.

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

#### 15. REGULATORY INFORMATION

##### TOXIC SUBSTANCES CONTROL ACT (TSCA)

**TSCA INVENTORY STATUS:** All components are on the U.S. EPA TSCA Inventory List.



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**OTHER TSCA ISSUES:** TSCA (Toxic Substances Control Act) - Section 4 - Chemical Test Rules (40 CFR 799)  
TSCA Section 8(a) Preliminary Assessment Information Rule (PAIR) (40 CFR 712, Subpt. B)  
TSCA (Toxic Substances Control Act) - Section 8(d) - 716.120(d) - Health and Safety Reporting - Listed Members of Categories  
TSCA High Production Volume (HPV) Chemicals: 1990, 1994 & Post-1994 Additions (01/31/05)  
TSCA 12(b): This product contains a chemical or chemicals that require Export Notification.

Additional TSCA information may exist. Contact VWR if you have questions regarding your application or use of this product.

#### SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

<u>INGREDIENT NAME</u>	<u>SARA/CERCLA RQ (lb)</u>	<u>SARA EHS TPQ (lb)</u>
Tetrahydrofuran (109-99-9)	1000	None

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

**SECTION 311 HAZARD CLASS:** Immediate. Fire. Reactive.

#### **SARA 313 TOXIC CHEMICALS:**

The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

<u>INGREDIENT NAME</u>	<u>COMMENT</u>
No ingredients listed in this section.	None

#### STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

<u>INGREDIENT NAME</u>	<u>WEIGHT %</u>	<u>COMMENT</u>
Tetrahydrofuran (109-99-9)	100	CA, MA, MN, NJ, PA, RI

#### **ADDITIONAL REGULATORY INFORMATION:**

None.

#### **WHMIS CLASSIFICATION (CANADA):**

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all information required by CPR.





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**WHMIS Classification:**

B2- Flammable Liquid

D2B - Irritating to Eyes and Skin

**FOREIGN INVENTORY STATUS:**

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC	AUST	PHIL	MITI	KOREA	CHINA
Tetrahydrofuran	109-99-9	Yes	DSL	EINECS	Yes	Yes	Yes	Yes	Yes

**16. OTHER INFORMATION****CURRENT ISSUE DATE:** February 8, 2006**PREVIOUS ISSUE DATE:** New MSDS.**CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:**

New MSDS.

**OTHER INFORMATION:** As per the OSHA Hazard Communication Standard, 1910.1200, the information contained within this MSDS must be given to those persons using this material. For laboratory use only. Not for food or drug use. Do not store with foodstuffs.**KEY/LEGEND:** ACGIH = American Conference of Governmental Industrial Hygienists; CAS = Chemical Abstracts Service; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; CPR = Controlled Products Regulations; DOT = Department of Transportation; DSL = Domestic Substances List; EINECS = European Inventory of Existing Commercial Chemical Substances; EPA = Environmental Protection Agency; IARC = International Agency for Research on Cancer; IATA = International Air Transport Association; mg/Kg = milligrams per Kilogram; mg/L = milligrams per Liter; mg/m<sup>3</sup> = milligrams per Cubic Meter; MSHA = Mine Safety and Health Administration; NA = Not Applicable or Not Available; NIOSH = National Institute for Occupational Safety and Health; NJTSR = New Jersey Trade Secret Registry; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; SARA = Superfund Amendments and Reauthorization Act; TDG = Transport Dangerous Goods; TSCA = Toxic Substances Control Act; WHMIS = Workplace Hazardous Materials Information System.

End of Sheet #BDH-390