



Material Safety Data Sheet

Material Name: SAFETY-KLEEN TETRAHYDROFURAN

ID: 82384

*** Section 1 - Chemical Product and Company Identification ***

Product Name: Safety-Kleen Tetrahydrofuran

Product Code: 1021798, 1024798

Product Use: Chemical intermediate and vehicle for specialty coatings. If this product is used in combination with other products, refer to the Material Safety Data Sheets for those products.

Synonyms: Tetrahydrofuran, THF

Safety-Kleen Systems, Inc.
5360 Legacy Drive
Building 2, Suite 100
Plano, TX 75024

Phone: 1-800-669-5740

Emergency # 1-800-468-1760
www.safety-kleen.com

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July 17, 1991

PREPARED BY: Product MSDS Coordinator APPROVED BY: MSDS Task Force

*** Section 2 - Hazardous Identification ***

EMERGENCY OVERVIEW

Appearance

Clear and colorless liquid with an ether-like odor.

Signal Word

DANGER!

Physical Hazards

Extremely flammable liquid and vapor. Vapor may cause flash fire.

Health Hazards

May be harmful or fatal if inhaled. May be harmful or fatal if swallowed. May irritate the respiratory tract (nose, throat, and lungs), eyes, and skin. May be harmful if absorbed through skin. May cause central nervous system damage.

POTENTIAL HEALTH EFFECTS

Inhalation (Breathing)

High concentrations of vapor or mist may be harmful if inhaled. High concentrations of vapor or mist may irritate the respiratory tract (nose, throat, and lungs). High concentrations of vapor or mist may cause nausea, vomiting, headaches, dizziness, loss of coordination, numbness, and other central nervous system effects. Massive acute overexposure may cause rapid central nervous system depression, sudden collapse, coma, and/or death.

Eyes

May cause irritation with redness, tearing, and/or blurred vision.

Skin

May cause irritation. May be harmful if absorbed through skin.

Ingestion (Swallowing)

May be harmful if swallowed. May cause throat irritation, nausea, vomiting, and central nervous system effects as noted under **INHALATION (BREATHING)**. Breathing product into the lungs during ingestion or vomiting may cause lung injury and possible death.

Medical Conditions Aggravated by Exposure

Individuals with pre-existing liver, kidney, respiratory tract (nose, throat, and lungs), central nervous system, eye, and/or skin disorders may have increased susceptibility to the effects of exposure.

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Chronic

Prolonged or repeated inhalation and/or ingestion may cause liver, kidney, brain, and central nervous system damage. Prolonged or repeated inhalation may cause toxic effects as noted under INHALATION (BREATHING). Prolonged or repeated eye contact may cause inflammation of the membrane lining the eyelids and covering the eyeball (conjunctivitis). Prolonged or repeated skin contact may cause drying, cracking, redness, itching, and/or swelling (dermatitis). Prolonged or repeated exposure may cause mutagenicity and/or reproductive toxicity.

Cancer Information

No known carcinogenicity. For more information, see SECTION 11: CARCINOGENICITY.

Environmental Hazards

Not expected to be harmful to aquatic life. Also see SECTION 12: ECOLOGICAL INFORMATION.

*** Section 3 - Composition / Information on Ingredients ***

CAS	Component	Percent
109-99-9	Tetrahydrofuran	99-100

*** Section 4 - First Aid Measures ***

Inhalation (Breathing)

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Oxygen should only be administered by qualified personnel. Someone should stay with victim. Get medical attention if breathing difficulty persists.

Eyes

If irritation or redness from exposure to vapor develops, move away from exposure into fresh air. Upon contact, immediately flush eyes with plenty of lukewarm water, holding eyelids apart, for 15 minutes. Get medical attention.

Skin

Remove affected clothing and shoes. Wash skin thoroughly with soap and water. Get medical attention if irritation or pain develops or persists. Wash contaminated clothing before reuse.

Ingestion (Swallowing)

Do NOT induce vomiting. Immediately get medical attention. Call 1-800-468-1760 for additional information. If spontaneous vomiting occurs, keep head below hips to avoid breathing the product into the lungs. Never give anything by mouth to an unconscious person.

Notes to Physicians

Treat symptomatically and supportively. Do not administer Adrenaline (epinephrine) or similar drugs following product overexposure. Increased sensitivity of the heart to such drugs may be caused by overexposure to product. Treatment may vary with condition of victim and specifics of incident. Call 1-800-468-1760 for additional information.

*** Section 5 - Fire Fighting Measures ***

Hazardous Combustion Products

Decomposition and combustion materials may be toxic. Burning may produce carbon monoxide and unidentified organic compounds.

Conditions of Flammability

Heat, sparks, or flame.

Extinguishing Media

Carbon dioxide, alcohol-resistant foam, dry chemical, water spray, or water fog.

Protective Equipment For Firefighting

A positive-pressure, self-contained breathing apparatus (SCBA) and full-body protective equipment are required for fire emergencies.

Fire Fighting Equipment/Instructions

Keep storage containers cool with water spray.

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

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

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Fire and Explosion Hazards

Vapor explosion hazard indoors, outdoors, or in sewers. Vapor may travel to ignition source and flashback. Vapors will spread along the ground and collect in low or confined areas. Run-off to sewer may create a fire or explosion hazard. Heated containers may rupture, explode, or be thrown into the air. "Empty" containers may retain residue and can be dangerous. Product is not sensitive to mechanical impact. Product may be sensitive to static discharge, which could result in fire or explosion.

*** Section 6 - Accidental Release Measures ***

Remove all ignition sources. Do not touch or walk through spilled product. Stop leak if you can do it without risk. Wear protective equipment and provide engineering controls as specified in **SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Ventilate area and avoid breathing vapor or mist. A vapor suppressing foam may be used to reduce vapors. Contain spill away from surface water and sewers. Contain spill as a liquid for possible recovery, or sorb with compatible sorbent material and shovel with a clean, sparkproof tool into a sealable container for disposal. Additionally, for large spills: Water spray may reduce vapor, but may not prevent ignition in closed spaces. Dike far ahead of liquid spill for collection and later disposal. There may be specific federal regulatory reporting requirements associated with spills, leaks, or releases of this product. Also see **SECTION 15: REGULATORY INFORMATION**.

*** Section 7 - Handling and Storage ***

Handling Procedures

Keep away from heat, sparks, or flame. Do not evaporate to dryness or distill, an explosion may occur. Stored tetrahydrofuran must be tested for peroxides before using. Where flammable mixtures may be present, equipment safe for such locations should be used. Use clean, sparkproof tools and explosion-proof equipment. When transferring product, metal containers, including trucks and tank cars, should be grounded and bonded. Do not breathe vapor or mist. Use in a well ventilated area. Avoid contact with eyes, skin, clothing, and shoes. Do not smoke when using this product.

Shipping and Storing

Keep container tightly closed when not in use and during transport. Stored tetrahydrofuran must be tested for peroxides before using. Do not pressurize, cut, weld, braze, solder, drill, or grind containers. Keep containers away from heat, flame, sparks, static electricity, or other sources of ignition; containers may explode and cause injury or death. Empty product containers may retain product residue and can be dangerous. See **SECTION 14: TRANSPORTATION INFORMATION** for Packing Group information.

*** Section 8 - Exposure Controls / Personal Protection ***

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
OSHA Final:	200 ppm TWA; 590 mg/m ³ TWA
OSHA Vacated:	200 ppm TWA; 590 mg/m ³ TWA 250 ppm STEL; 735 mg/m ³ STEL
NIOSH:	200 ppm TWA; 590 mg/m ³ TWA 250 ppm STEL; 735 mg/m ³ STEL

Engineering Controls

Provide general ventilation needed to maintain concentration of vapor or mist below applicable exposure limits. Where adequate general ventilation is unavailable, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below applicable exposure limits. Where explosive mixtures may be present, equipment safe for such locations should be used.

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Personal Protective Equipment: Respiratory

Use NIOSH-certified, air-supplied respirators (self-contained breathing apparatus or air-line) respiratory protective equipment when concentration of vapor or mist exceeds applicable exposure limits. Selection and use of respiratory protective equipment should be in accordance in the USA with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4. Consult a qualified Industrial Hygienist or Safety Professional for respirator selection guidance.

Personal Protective Equipment: Eyes/Face

Wearing chemical goggles is recommended. Contact lenses may be worn with eye protection.

Personal Protective Equipment: Skin

Wear chemical resistant (impervious) gloves. To avoid prolonged or repeated contact where spills and splashes are likely, wear appropriate chemical-resistant faceshield, boots, apron, whole body suits, or other protective clothing.

Personal Protective Equipment: Personal Hygiene

Use good personal hygiene. Wash thoroughly with soap and water after handling product and before eating, drinking, or using tobacco products. Clean affected clothing, shoes, and protective equipment before reuse. Discard affected clothing, shoes, and/or protective equipment if they cannot be thoroughly cleaned. Discard leather articles, such as shoes, saturated with this product.

Other Personal Protective Equipment

Where spills and splashes are likely, facilities storing or using this product should be equipped with an emergency eyewash and shower, both equipped with clean water, in the immediate work area.

*** Section 9 - Physical & Chemical Properties ***

Appearance/Odor :	Clear and colorless liquid with an ether-like odor.	pH:	Not applicable
Boiling Point:	153°F (67°C)	Melting Point:	-162°F (-108°C)
Solubility (H2O):	Complete	Specific Gravity:	0.89 (water = 1)
Density:	7.4 LB/US gal (890 g/l)	Octanol/H2O Coeff.:	Log Pow = 0.46
Evaporation Rate:	14.5 (butyl acetate = 1)	Molecular Weight:	72.1
Odor Threshold:	20 ppm	Auto Ignition:	610°F (321°C)
LFL:	2.0 VOL%	Flash Point:	7°F (-14°C) Closed Cup
UFL:	11.8 VOL%		
Vapor Pressure:	145 mm Hg at 68°F (20°C)		

*** Section 10 - Chemical Stability & Reactivity Information ***

Stability

This product is inhibited to prevent peroxide formation; therefore, it is stable under normal temperatures and pressures. However, an explosion may occur if evaporated to dryness or distilled. Check inhibitor concentration periodically.

Incompatibility

Avoid acids, alkalies, oxidizing agents, reactive halogens, or reactive metals. An explosion may occur if evaporated to dryness or distilled.

Reactivity

This product is inhibited to prevent peroxide formation; therefore, polymerization is not known to occur under normal temperatures and pressures, except when in contact with acids, heat or amines. Not reactive with water.

Hazardous Decomposition Products

Due to presence of inhibitor, none under normal temperatures and pressures. See also **SECTION 5: HAZARDOUS COMBUSTION PRODUCTS.**

Conditions To Avoid

Keep away from heat, ignition sources and incompatible materials. Do not allow product to evaporate to dryness.

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*** Section 11 - Toxicological Information ***

Toxicity Data

Component Analysis - LD50/LC50

Tetrahydrofuran (109-99-9)

Inhalation LC50 Rat 53.9 mg/L 4 h; Inhalation LC50 Rat 180 mg/L 1 h; Oral LD50 Rat 1650 mg/kg

Acute Effects

May irritate the respiratory tract (nose, throat, and lungs), eyes, and skin. May be absorbed through the skin. May be harmful if swallowed. High concentrations of vapor or mist may irritate the respiratory tract (nose, throat, and lungs). High concentrations of vapor or mist may cause nausea, vomiting, headaches, dizziness, loss of coordination, numbness, and other central nervous system effects. Massive acute overexposure may cause rapid central nervous system depression, sudden collapse, coma, and/or death. Breathing product into the lungs during ingestion or vomiting may cause lung injury and possible death.

Carcinogenicity

Component Carcinogenicity

Tetrahydrofuran (109-99-9)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

Target Organ Effects

Prolonged or repeated inhalation and/or ingestion may cause liver, kidney, brain, and central nervous system damage.

Sensitization

Based on best current information, there is no known human sensitization associated with this product.

Mutagenicity

Tetrahydrofuran has demonstrated experimental effects of mutagenicity.

Reproductive Toxicity

Tetrahydrofuran has demonstrated experimental effects of reproductive toxicity.

Teratogenicity

Based on best current information, there is no known teratogenicity associated with this product.

Toxicologically Synergistic Products

Based on best current information, there are no known toxicologically synergistic products associated with this product.

*** Section 12 - Ecological Information ***

Ecotoxicity

Not expected to be harmful to aquatic life.

Component Analysis - Ecotoxicity - Aquatic Toxicity

Tetrahydrofuran (109-99-9)

Duration/Test/Species

96 Hr LC50 Pimephales promelas
96 Hr LC50 Pimephales promelas

Concentration/Conditions/Notes

1970-2360 mg/L [flow-through]
2700-3600 mg/L [static]

Persistence/Degradability

No information available for the product.

Bioaccumulation/Accumulation

No information available for the product.

Mobility in Environmental Media

No information available for the product.

Other Adverse Effects

Not expected to be harmful to aquatic life.

*** Section 13 - Disposal Considerations ***

Disposal Instructions

Dispose in accordance with federal, state, provincial, and local regulations. Regulations may also apply to empty containers. The responsibility for proper waste disposal lies with the owner of the waste. Contact Safety-Kleen regarding proper recycling or disposal.

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US EPA Waste Number & Descriptions

U213 Based on available data, this information applies to the product as supplied to the user. Processing, use, or contamination by the user may change the waste code applicable to the disposal of this product.

If this product is used or spent prior to discard, the following waste code may apply: D001.

*** Section 14 - Transportation Information ***

Emergency Response Guide Number

127

Reference *North American Emergency Response Guidebook*

DOT Shipping Name: Tetrahydrofuran

UN/NA #: UN2056 Hazard Class: 3 Packing Group: II

Required Label(s): FLAMMABLE LIQUID

TDG Shipping Name: Tetrahydrofuran

UN/NA #: UN2056 Hazard Class: 3 Packing Group: II

Required Label(s): FLAMMABLE LIQUID

IATA Information

No Classification Assigned.

IMDG Information

No Classification Assigned.

*** Section 15 - Regulatory Information ***

Volatile Organic Compounds (As regulated)

100 WT%; 7.4 LB/US gal; 890 g/L As per 40 CFR Part 51.100(s)

SARA Sections 311/312

This product poses the following health hazard(s) as defined in 40 CFR Part 370 and is subject to the requirements of sections 311 and 312 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA):

Immediate (Acute) Health Hazard

Delayed (Chronic) Health Hazard

Fire Hazard

SARA 302/304

Component Analysis

This product does not contain any "extremely hazardous substances" listed pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) Section 302 or Section 304 as identified in 40 CFR Part 355, Appendix A and B.

SARA Section 313

This product does not contain "toxic" chemicals subject to the requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

Component Analysis

This product does not contain any "toxic" chemical subject to the requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

CERCLA

Component Analysis

This product contains the following "hazardous substance" listed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) in 40 CFR Part 302, Table 302.4 with the following reportable quantities (RQ):

Tetrahydrofuran (109-99-9)

1000 lb final RQ; 454 kg final RQ

TSCA

All the components of this product are listed on, or are automatically included as "naturally occurring chemical substances" on, or are exempted from the requirement to be listed on, the TSCA Inventory.

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Component Analysis

Component	CAS #	TSCA
Tetrahydrofuran	109-99-9	Yes

State Regulations

This product does not contain detectable amounts of any chemical known to the State of California to cause cancer.

This product may contain a detectable amount of toluene CAS 108-88-3. WARNING: This chemical is known to the State of California to cause birth defects or other reproductive harm.

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	MA	MN	NJ	PA	CA
Tetrahydrofuran	109-99-9	Yes	Yes	Yes	Yes	Yes

Canadian Regulations

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 the CPR.

Component Analysis

Component	CAS #	CAN
Tetrahydrofuran	109-99-9	DSL

Canadian WHMIS Information

Class B2 - Flammable Liquid Class D2B - Irritating to eyes and skin. Class D2A - Chronic toxic effects.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Tetrahydrofuran (109-99-9) 1 %

Canadian Environmental Protection Act (CEPA)

All the components of this product are listed on, or are automatically included as "substance occurring in nature" on, or are exempted from the requirements to be listed on, the Canadian Domestic Substances List (DSL).

* * * **Section 16 - Other Information** * * *

Label/Other Information

Not available.

Revision Information

Regulatory update, updated to ANSI Z400.1-2004 format. This MSDS has been revised in the following sections: Section 1 (Dates/Address), Section 2 and Section 3 (Switched), Section 3 (Emergency Overview, Eyes, Skin, Chronic fields updated), Section 4 (Phone Numbers), Section 5 (Fire Fields), Section 8 (Exposure Limits added), Section 10 (Fields updated), Section 11 (Toxicology fields updated), Section 12 (Ecotoxicity, fields updated), Section 16 (Revision Information).

Disclaimer

User assumes all risks incident to the use of this product. To the best of our knowledge, the information contained herein is accurate. However, Safety-Kleen assumes no liability whatsoever for the accuracy or completeness of the information contained herein. No representations or warranties, either expressed or implied, or merchantability, fitness for a particular purpose or of any other nature are made hereunder with respect to the information or the product to which the information refers. The data contained on this sheet apply to the product as supplier to the user.

End of Sheet 82384