

Section 1 - PRODUCT AND COMPANY IDENTIFICATION**Material Name**

SAFETY-KLEEN TETRAHYDROFURAN

Product Code

1021798, 1024798

Synonyms

Tetrahydrofuran, THF

Product Use

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

Restrictions on Use

None known.

Manufacturer Information

Safety-Kleen Systems, Inc.
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Emergency # 1-800-468-1760

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July 17, 1991

Section 2 - HAZARDS IDENTIFICATION**Classification in accordance with paragraph (d) of 29 CFR 1910.1200.**

Flammable Liquids - Category 2

Acute Toxicity - Oral - Category 4

Skin Corrosion/Irritation - Category 2

Serious Eye Damage/Eye Irritation - Category 2A

Carcinogenicity - Category 2

Specific target organ toxicity - Single exposure - Category 3

Specific target organ toxicity - Repeated exposure - Category 1

GHS Label Elements**Symbol(s)****Signal Word**

Danger

Hazard Statement(s)

Highly flammable liquid and vapor.

Harmful if swallowed.

Causes serious eye irritation.

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Suspected of causing cancer.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Causes damage to organs through prolonged or repeated exposure. (kidneys, liver, nervous system)

Precautionary Statement(s)

Prevention

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flame/hot surfaces - No smoking. Keep container tightly closed. Ground/Bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection. Wash thoroughly after handling.

Response

In case of fire, use carbon dioxide, alcohol-resistant foam, dry chemical, water spray, water fog. IF EXPOSED or concerned: Get medical advice/attention. IF INHALED. Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs, get medical advice/attention. Wash contaminated clothing before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF SWALLOWED: Do NOT induce vomiting. Immediately get medical attention.

Storage

Store in a well-ventilated place. Keep cool. Keep container tightly closed. Store locked up.

Disposal

Dispose in accordance with all applicable local regulations.

Other Hazards

May form explosive peroxides.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

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

Section 4 - FIRST AID MEASURES

Inhalation

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

Ingestion

IF SWALLOWED: Do NOT induce vomiting. Immediately get medical attention. 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.

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Most Important Symptoms/Effects

Acute

Skin irritation, eye irritation, respiratory tract irritation, central nervous system depression.

Delayed

Cancer, kidney damage, liver damage, nervous system damage.

Indication of any immediate medical attention and special treatment needed

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

Extinguishing Media

Suitable Extinguishing Media

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

Unsuitable Extinguishing Media

Do not scatter spilled material with high-pressure water streams.

Special Hazards Arising from the Chemical

Highly flammable liquid and vapor. Vapors or gases may ignite at distant ignition sources and flash back. Most vapors are heavier than air and will spread along ground and collect in low or confined areas (drains, basements, tanks). Heated containers may rupture. "Empty" containers may retain residue and can be dangerous. Product may be sensitive to static discharge, which could result in fire or explosion.

Hazardous Combustion Products

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

Fire Fighting Measures

Move container from fire area if it can be done without risk. Keep away from sources of ignition - No Smoking. Cool containers with water spray until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn.

Special Protective Equipment and Precautions for Firefighters

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

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

Wear personal protective clothing and equipment, see Section 8. Avoid release to the environment.

Methods and Materials for Containment and Cleaning Up

Remove all ignition sources. Do not touch or walk through spilled product. Stop leak if you can do it without risk. 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.

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Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling

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 shoes. Do not smoke when using this product.

Conditions for Safe Storage, Including any Incompatibilities

Store in a well-ventilated place. Keep cool. Keep container tightly closed. Store locked up. 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.

Incompatible Materials

Acids, alkalis, amines, oxidizing agents, halogens, reactive metals.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

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
NIOSH:	200 ppm TWA ; 590 mg/m ³ TWA; 250 ppm STEL ; 735 mg/m ³ STEL 2000 ppm IDLH (10% LEL)
OSHA (US):	200 ppm TWA ; 590 mg/m ³ TWA

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)

Tetrahydrofuran (109-99-9)

2 mg/l Medium: urine Time: end of shift Parameter: Tetrahydrofuran

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.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection

Safety glasses with side shields should be worn at a minimum. Additional protection like goggles, face shields, or respirators may be needed dependent upon anticipated use and concentrations of mists or vapors. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. Contact lens use is not recommended.

Skin Protection

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

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Respiratory Protection

A respiratory protection program which meets USA's OSHA General Industry Standard 29 CFR 1910.134 or Canada's CSA Standard Z94.4-M1982 requirements must be followed whenever workplace conditions warrant a respirator's use. Consult a qualified Industrial Hygienist or Safety Professional for respirator selection guidance.

Glove Recommendations

Where skin contact is likely, wear gloves impervious to product; use of natural rubber (latex) or equivalent gloves is not recommended. To avoid prolonged or repeated contact where spills and splashes are likely, wear appropriate chemical-resistant face shield, boots, apron, whole body suits or other protective clothing. When product is heated and skin contact is likely, wear heat-resistant gloves, boots, and other protective clothing.

Protective Materials

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to regulatory requirements. The following PPE should be considered the minimum required: Safety glasses, Gloves, Lab coat or apron.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear.	Physical State	Liquid
Odor	Ether.	Color	Colorless.
Odor Threshold	20 ppm	pH	Not available
Melting Point	-108 °C (-162 °F)	Boiling Point	67 °C (153 °F)
Boiling Point Range	Not available	Freezing point	-162 °F
Evaporation Rate	14.5 (Butyl acetate = 1)	Flammability (solid, gas)	Not applicable
Autoignition Temperature	321 °C (610 °F)	Flash Point	-14 °C (7 °F)
Lower Explosive Limit	2 vol%	Decomposition temperature	Not available
Upper Explosive Limit	11.8 vol%	Vapor Pressure	145 mmHg @ 68°F °C (20° C)
Vapor Density (air=1)	2.5 (Air = 1)	Specific Gravity (water=1)	0.89 (Water = 1)
Water Solubility	(Complete)	Partition coefficient: n-octanol/water	Not available
Viscosity	Not available	Kinematic viscosity	Not available
Solubility (Other)	Not available	Coefficient of Water/Oil Dist	0.46
Density	7.4 lb/gal (US)	Physical Form	Liquid.
Volatility	100 wt% (as per 40 CFR part 51.100(s))	Molecular Weight	72.1

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Section 10 - STABILITY AND REACTIVITY

Reactivity

May form explosive peroxides.

Chemical 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.

Possibility of Hazardous Reactions

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.

Conditions to Avoid

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

Incompatible Materials

Acids, alkalis, amines, oxidizing agents, halogens, reactive metals.

Hazardous decomposition products

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

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation

Irritation, nausea, vomiting, headache, drowsiness, dizziness, loss of coordination, numbness, unconsciousness, coma.

Skin Contact

Skin irritation, absorbed through the skin.

Eye Contact

Eye irritation, redness, tearing, blurred vision.

Ingestion

Irritation, nausea, vomiting, headache, drowsiness, dizziness, loss of coordination

Acute and Chronic Toxicity

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

Tetrahydrofuran (109-99-9)

Oral LD50 Rat 1650 mg/kg; Inhalation LC50 Rat 21000 ppm 3 h

Product Toxicity Data

Acute Toxicity Estimate

Inhalation - Vapor	> 20 mg/L
Oral	1658.2915 mg/kg

Immediate 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

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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.

Delayed Effects

Based on best current information, there is no known human sensitization associated with this product. Tetrahydrofuran has demonstrated animal effects of mutagenicity. Tetrahydrofuran has demonstrated animal effects of reproductive toxicity. Based on best current information, there is no known teratogenicity associated with this product.

Irritation/Corrosivity Data

No data available.

Respiratory Sensitization

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

Dermal Sensitization

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

Component Carcinogenicity

Tetrahydrofuran	109-99-9
ACGIH:	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
IARC:	Monograph 119 [2019] (Group 2B (possibly carcinogenic to humans))
DFG:	Category 4 (no significant contribution to human cancer)
OSHA:	Present

Germ Cell Mutagenicity

Tetrahydrofuran has demonstrated experimental effects of mutagenicity.

Tumorigenic Data

No data available

Reproductive Toxicity

Tetrahydrofuran and hexane have demonstrated animal effects of reproductive toxicity.

Specific Target Organ Toxicity - Single Exposure

Central nervous system, respiratory tract

Specific Target Organ Toxicity - Repeated Exposure

Kidneys, liver, nervous system

Aspiration hazard

No data available.

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.

Section 12 - ECOLOGICAL INFORMATION

Component Analysis - Aquatic Toxicity

Tetrahydrofuran	109-99-9
Fish:	LC50 96 h Pimephales promelas 1970 - 2360 mg/L [flow-through]; LC50 96 h Pimephales promelas 2700 - 3600 mg/L [static]

Invertebrate Toxicity

No additional information is available.

Persistence and Degradability

No information available for the product.

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Bioaccumulative Potential

No information available for the product.

Mobility

No information available for the product.

Other Toxicity

No additional information is available.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods

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. 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. Following consultation with waste management company and after solidification, landfill together with household waste. Hazardous Waste Number(s): D001.

Section 14 - TRANSPORT INFORMATION

US DOT Information:

Shipping Name: TETRAHYDROFURAN

Hazard Class: 3

UN/NA #: UN2056

Packing Group: II

Required Label(s): 3

IATA Information:

Shipping Name: TETRAHYDROFURAN

Hazard Class: 3

UN#: UN2056

Packing Group: II

Required Label(s): 3

IMDG Information:

Shipping Name: TETRAHYDROFURAN

Hazard Class: 3

UN#: UN2056

Packing Group: II

Required Label(s): 3

TDG Information:

Shipping Name: TETRAHYDROFURAN

Hazard Class: 3

UN#: UN2056

Packing Group: II

Required Label(s): 3

International Bulk Chemical Code

This material contains one or more of the following chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

Tetrahydrofuran	109-99-9
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IBC Code:	Category Z
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Further information

Emergency Response Guide Number: 127 Reference: North American Emergency Response Guidebook

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

Tetrahydrofuran	109-99-9
CERCLA:	1000 lb final RQ ; 454 kg final RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories

Flammable; Carcinogenicity; Acute toxicity; Skin Corrosion/Irritation; Serious Eye Damage/Eye Irritation; Specific Target Organ Toxicity

U.S. State Regulations

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

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

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

Not listed under California Proposition 65.

Component Analysis - Inventory

Tetrahydrofuran (109-99-9)

US	CA	AU	CN	EU	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2
Yes	DSL	Yes	Yes	EIN	Yes	Yes	Yes	No
KR - REACH CCA			MX	NZ	PH	TH-TECI	TW	VN (Draft)
No			Yes	Yes	Yes	Yes	Yes	Yes

Section 16 - OTHER INFORMATION

NFPA Ratings

Health: 2 Fire: 3 Instability: 1

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

Summary of Changes

Regulatory review and update.

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania*; CAS - Chemical Abstracts Service;

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CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CFR - Code of Federal Regulations (US); CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EC - European Commission; EEC - European Economic Community; EIN - European Inventory of (Existing Commercial Chemical Substances); EINECS - European Inventory of Existing Commercial Chemical Substances; ENCS - Japan Existing and New Chemical Substance Inventory; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; F - Background (for Venezuela Biological Exposure Indices); IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; ISHL - Japan Industrial Safety and Health Law; IUCLID - International Uniform Chemical Information Database; JP - Japan; Kow - Octanol/water partition coefficient; KR KECI Annex 1 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); KR KECI Annex 2 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL), KR - Korea; LD50/LC50 - Lethal Dose/ Lethal Concentration; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX - Mexico; Ne - Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL - Non-Domestic Substance List (Canada); NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL - Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH - Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; Sc - Semi-quantitative; STEL - Short-term Exposure Limit; TCCA - Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW - Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North American; US - United States; VLE - Exposure Limit Value (Mexico); VN (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other 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, of 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 supplied to the user.