Material Safety Data Sheet

Borane-tetrahydrofuran complex, 1M solution in tetrahydrofuran

ACC# 34700

Section 1 - Chemical Product and Company Identification

MSDS Name: Borane-tetrahydrofuran complex, 1M solution in tetrahydrofuran
Catalog Numbers: AC175080000, AC175081000, AC175088000
Synonyms: Trihydro(tetrahydrofuran)boron in THF.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
109-99-9	Tetrahydrofuran	91	203-726-8
14044-65-6	Borane-tetrahydrofuran complex	9	237-881-8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: -17 deg C.
Danger! Water-reactive. Extremely flammable liquid and vapor. Vapor may cause flash fire. Causes respiratory tract irritation. Stench. Causes eye and skin irritation. May be harmful if swallowed. May form explosive peroxides. May cause central nervous system effects. May cause liver and kidney damage. Moisture sensitive. Keep refrigerated. (Store below 4°C/39°F.)
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation.
Ingestion: May cause irritation of the digestive tract. May cause liver and kidney damage. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause headache.
Inhalation: Causes respiratory tract irritation. May cause effects similar to those described for ingestion. May be harmful if inhaled. Exposure to high concentrations may produce narcosis, nausea and loss of consciousness.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Reacts violently with water giving off flammable gas which may explode. Extremely flammable liquid and vapor. This substance reacts with water to form gases which might cause closed containers to rupture. Will be easily ignited by heat, sparks or flame. Vapors may form an explosive mixture with air. Containers may explode when heated. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Use dry chemical to fight fire. DO NOT USE WATER!
Flash Point: -17 deg C (1.40 deg F)
Autoignition Temperature: 321 deg F (160.56 deg C)
Explosion Limits, Lower:2.0%
Upper: 11.8%
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2; Special Hazard: -W-

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Approach spill from upwind.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not allow water to get into the container because of violent reaction. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Container should be opened by a technically qualified person. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Avoid breathing vapor.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a dry area. Keep under a nitrogen blanket. Store in a cool, dry, well-ventilated area away from incompatible substances. Refrigerator/flammables. Regularly check inhibitor levels to maintain peroxide levels below 1%. After opening, purge container with nitrogen before reclosing. Periodically test for peroxide formation on long-term storage. Addition of water or appropriate reducing materials will lessen peroxide formation. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals. All peroxidizable substances should be stored away from heat and light and be protected from ignition sources.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Tetrahydrofuran	50 ppm TWA; 100 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous r oute	200 ppm TWA; 590 mg/m3 TWA 2000 ppm IDLH	200 ppm TWA; 590 mg/m3 TWA
Borane-tetrahydrofuran complex	none listed	none listed	none listed

OSHA Vacated PELs: Tetrahydrofuran: 200 ppm TWA; 590 mg/m3 TWA Borane-tetrahydrofuran complex: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: Stench.
pH: Not available.
Vapor Pressure: 145 mm Hg @ 20 deg C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 66 deg C
Freezing/Melting Point:-108 deg C
Decomposition Temperature: Not available.
Solubility: reacts
Specific Gravity/Density:.8980g/cm3
Molecular Formula:C4H11BO
Molecular Weight:85.94

Section 10 - Stability and Reactivity

Chemical Stability: Unstable. This material may be sensitive to peroxide formation. Under normal storage conditions, peroxidizable compounds can form and accumulate peroxides which may explode when subjected to heat or shock. This material is most hazardous when peroxide levels are concentrated by distillation or evaporation.
Conditions to Avoid: High temperatures, mechanical shock, incompatible materials, ignition sources, moisture, contact with water, excess heat, exposure to moist air or water.
Incompatibilities with Other Materials: Acids, acid chlorides, acid anhydrides, oxidizing agents, alcohols, and water.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, oxides of boron, borane, hydrogen gas.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 109-99-9: LU5950000
CAS# 14044-65-6 unlisted.
LD50/LC50:
CAS# 109-99-9:
Inhalation, rat: LC50 = 21000 ppm/3H;
Oral, rat: LD50 = 1650 mg/kg;
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CAS# 14044-65-6:
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Carcinogenicity:
CAS# 109-99-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Not listed.

CAS# 14044-65-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Cas# 109-00-0:LC50(96Hr.) Fathead Minnow = 2160 mg/L
Environmental: Tetrahydrofuran is expected to biodegrade under aerobic conditions but may be resistant to biodegradation in anaerobic environments.
Physical: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere, tetrahydrofuran, which has a vapor pressure of 162 mm Hg at 25 deg C, determined from experimentally-derived coefficients, will exist solely as a vapor in the ambient atmosphere. Vapor-phase tetrahydrofuran is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals and nitrate radicals; the half-lives for these reactions in air are estimated to be about 1 day and 3 days, respectively.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 109-99-9: waste number U213 (Ignitable waste).

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	ORGANOMETALLIC COMPOUND,WATER-REA (BORANE TETRAH)
Hazard Class:	4.3	4.3(3)
UN Number:	UN3399	UN3207
Packing Group:	II	II
Additional Info:		FP -17C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 109-99-9 is listed on the TSCA inventory.
CAS# 14044-65-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
CAS# 109-99-9: Testing required by manufacturers, processors; Test for Health Effects
Section 12b
CAS# 109-99-9: Section 4
TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 109-99-9: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 109-99-9: immediate, fire, reactive.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 109-99-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 14044-65-6 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XI F

Risk Phrases:

R 11 Highly flammable.
R 15 Contact with water liberates extremely flammable gases.
R 19 May form explosive peroxides.
R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 29 Do not empty into drains.
S 33 Take precautionary measures against static discharges.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)

CAS# 109-99-9: 1
CAS# 14044-65-6: No information available.

Canada - DSL/NDSL

CAS# 109-99-9 is listed on Canada's DSL List.
CAS# 14044-65-6 is listed on Canada's NDSL List.

Canada - WHMIS

This product has a WHMIS classification of B2.

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

Canadian Ingredient Disclosure List

CAS# 109-99-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/01/1999
Revision #5 Date: 3/22/2006