SILVER FERN CHEMICAL

Material Safety Data Sheet

GLYCOL ETHER DE

SECTION 1: IDENTIFICATION

Product Name: Glycol Ether DE

Chemical Family: Glycol Ethers

CAS Number: 111-90-0

Chemical Name: 2-(2-ethoxyethoxy) ethanol

Synonyms: Diethylene Glycol Monoethyl Ether; DGEE

Company
Silver Fern Chemical, Inc.
2226 Queen Anne Avenue North
Suite #C
Seattle WA 98109, USA

Business Contact
Customer Service: 206-282-3376
info@silverfernchemical.com

24 Hour Emergency Contact
Infotrac 800-535-5053
Outside USA & Canada 352-323-3500

SECTION 2: HAZARD IDENTIFICATION

Emergency Overview
This material is HAZARDOUS by OSHA Hazard Communication definition.

Signal Word
WARNING.

Hazards
Can cause eye and skin irritation. Vapor and mist may cause respiratory tract irritation. Toxic amounts may be inhaled or absorbed through skin and gastrointestinal tract which may cause central nervous system depression, respiratory and gastrointestinal tract and liver injury. May cause liver and/or kidney damage.

HMIS (U.S.A.):
Health Hazard: 1
Fire Hazard: 2

Reactivity: 0
Personal Protection: E

National Fire Protection Association (U.S.A.):
Health: 1
Flammability: 2
Reactivity: 0

Physical State
Viscous liquid.

Color
Colorless.

Odor
Sweet odor.

Odor Threshold
No value available.

Potential Health Effects
Routes of Exposure
Eye. Inhalation. Skin.

Signs and Symptoms of Acute Exposure
See component summary.

• **Diethylene Glycol Monoethyl Ether 111-90-0**
Moderate eye irritant. Slight skin irritant. May produce symptoms of CNS depression including headache, dizziness, nausea, loss of sense of balance, drowsiness, and visual disturbances.

• **2-Ethoxyethanol 110-80-5**
Slight eye irritant. Inhalation hazard. Exposure to this material may cause respiratory irritation. This substance may cause effects on the central nervous system, liver and kidneys. This material may be absorbed through the skin. Not a skin irritant. Not expected to be a sensitizer. Overexposure may cause Central Nervous System Depression,

reproductive toxicity, and developmental effects.

• **Ethylene glycol 107-21-1**
Ingestion hazard. Ingestion may include inebriation, nausea and vomiting, metabolic acidosis, and CNS depression. Cardiopulmonary effects including tachycardia, hypertension, severe metabolic acidosis with hyperventilation, hypoxia, congestive heart failure and adult respiratory distress syndrome, as well as, renal failure are also possible. May also produce a local irritation effect on the digestive system, and cause pain and bleeding. Irritation of the eyes and respiratory system. Effects of eye irritation are reversible. High aerosol concentrations may cause respiratory irritation. Mildly irritating to the skin but not a skin sensitizer. Not a skin absorption hazard.

Skin
Brief skin contact may cause slight irritation. Prolonged contact may cause redness and swelling. This material may be absorbed through the skin.

Inhalation
Due to low vapor pressure, significant exposure by inhalation appears unlikely. However, exposure to high concentrations of mist, aerosol, or vapors at elevated temperatures may cause irritation, coughing and discomfort in the nose, throat, and chest.

Eye
Eye contact may cause conjunctival irritation and slight transitory irritation of the cornea.

Ingestion
May cause CNS depression, gastrointestinal tract, liver and kidney damage.

Chronic Health Effects
See component summary.

• **Diethylene Glycol Monoethyl Ether 111-90-0**
Repeated or prolonged skin contact may cause slight transient irritation. Skin absorption may add significantly to the overall toxic effect. Prolonged or high exposures may cause CNS effects and liver and kidney changes.

• **2-Ethoxyethanol 110-80-5**
Repeated, prolonged, or excessive exposure may result in reproductive and developmental effects, immune system depression, effects in the liver, thymus, kidney, liver, testes, and hematopoietic tissues. Prolonged exposure may affect central nervous system and respiration.

• **Ethylene glycol 107-21-1**
Prolonged or repeated inhalation or ingestion may result in kidney and liver changes. Avoid repeated contact with this material. EGME, related compounds, and metabolites, have been shown to cause birth defects, delayed pregnancy rates, sperm changes, and other reproductive effects. Observe the American Conference of Governmental Industrial Hygiene (ACGIH) Threshold Limit Value (TLV) for ethylene glycol.

Conditions Aggravated by Exposure
Any pre-existing disorders or diseases of the: eyes skin kidney central nervous system (CNS) and/or reproductive system.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

Component Name	CAS #	EU Inventory	Concentration Wt.%
Diethylene Glycol Monoethyl Ether	111-90-0	203-919-7	>= 99.0
2-Ethoxyethanol	110-80-5	203-804-1	< 0.4
Ethylene glycol	107-21-1	203-473-3	< 0.2

Compositions given are typical values, not specifications.

SECTION 4: FIRST AID MEASURES

General
Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid. For specific information refer to the Emergency Overview in Section 2 of this MSDS.

Skin
Immediately remove excess chemical and contaminated clothing; thoroughly wash contaminated skin with mild soap and water. If irritation persists after washing, seek medical attention. Thoroughly clean contaminated clothing before reuse; discard contaminated leather goods (gloves, shoes, belts, wallets, etc.).

Inhalation
If symptoms are experienced, move victim to fresh air. Seek medical attention if discomfort persists.

Eye
Thoroughly flush the eyes with large amounts of clean low-pressure water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation persists, seek medical attention.

Ingestion
If product is ingested, do not induce vomiting and contact a physican or Poison Control Center.

Note to Physician
Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient. Treatment of metabolic acidosis, administration of ethanol, and hemodialysis may be indicated.

SECTION 5: FIRE FIGHTING MEASURES

Flammable Properties

Classification
OSHA/NFPA Class IIIA Combustible Liquid.

Flash Point
91 °C (195.8 °F) (TCC)

Auto-Ignition Temperature
204 °C (399.2 °F)

Lower Flammable Limit
No Data Available.

Upper Flammable Limit
No Data Available.

Extinguishing Media
Suitable:
SMALL FIRE: Use dry chemicals, CO2, water spray or alcohol-resistant foam LARGE FIRE: Use water spray, water fog or alcohol-resistant foam

Protection of Firefighters

Protective Equipment/Clothing:
Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.

Fire Fighting Guidance:
Airborne mists from this substance are a moderate fire and explosion hazard. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Hazardous Combustion Products:
Carbon oxides (CO, CO2)

SECTION 6: ACCIDENTAL RELEASE MEASURES

Release Response
Contain spill with dike to prevent entry into sewers or waterways. For large spills, dike and pump into properly labeled containers for reclamation or disposal. For small spills, soak up with absorbent material and place in properly labeled containers for disposal. All recovered material should be packaged, labeled, transported and disposed of or reclaimed in conformance with applicable laws and regulations and in conformance with good engineering practices. Reclaim where possible.

SECTION 7: HANDLING AND STORAGE

Handling
Do not handle near heat, sparks, or flame. Avoid contact with incompatible agents. Use only with adequate ventilation/personal protection. Avoid contact with eyes, skin and clothing. Do not enter storage area unless adequately ventilated. Metal containers involved in the transfer of this material should be grounded and bonded. It is recommended that any liquid product exposed to air not be highly concentrated by evaporation without first assuring that no peroxide is present. Alternately, positive steps should be taken to reduce any accumulated peroxides to a safe level before concentrating the liquid.

Storage
Store containers in a cool, dry, ventilated, fire resistant area away from sources of ignition and incompatible materials. Keep containers tightly closed and properly labeled.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits.

Personal Protection

Inhalation: A respiratory protection program that meets OSHA's 29 CFR 1910.134 or ANSI Z88.2 requirements must be followed whenever workplace conditions warrant respirator use.

Skin: Wear chemical resistant gloves such as rubber, neoprene or vinyl. Additional protective clothing may include disposable coveralls such as TYVEK if conditions warrant.

Eye: Eye protection such as chemical splash goggles and/or face shield must be worn when possibility exists for eye contact due to splashing or spraying liquid, airborne particles, or vapor.

Additional Remarks

Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices.

Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing/wash thoroughly before reuse. Shower after work using plenty of soap and water.

Occupational Exposure Limits

Component Name	Source	Type	Value	Notation
2-Ethoxyethanol	US (ACGIH)	TWA	5 ppm	Skin
	US (OSHA)	TWA	200 ppm 740 mg/m3	Skin
Ethylene glycol	US (ACGIH)	CEILING	100 mg/m3 aerosol only	None

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Viscous liquid. Colorless.
Odor: Sweet odor.
Odor Threshold: No value available.
pH: Not applicable.
Boiling Point/Boiling Range: 198 °C (388.4 °F)
Freezing Point/Melting Point: -76 °C (-104.8 °F)
Flash Point: 91 °C (195.8 °F) (TCC)
Auto-ignition: 204 °C (399.2 °F)
Flammability: OSHA/NFPA Class IIIA Combustible Liquid.
Lower Flammable Limit: No Data Available.
Upper Flammable Limit: No Data Available.
Explosive Properties: No Data Available.
Oxidizing Properties: No Data Available.
Vapor Pressure: 0.1 mm Hg @ 20 °C (68 °F)
Evaporation Rate: 0.013 (butyl acetate = 1)
Relative Density: 0.991 @ 20 °C (68 °F) (Water = 1)
Relative Vapor Density: 4.62 (Air = 1.0)
Viscosity: 3.85 mPa.s
Solubility (Water): 100%
Partition Coefficient (Kow): Log Kow = -0.54
Additional Physical and Chemical Properties: Hygroscopic. Additional properties may be listed in Sections 2 and 5.

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability
The product is stable.

Conditions to Avoid
Avoid contact with strong oxidizers, excessive heat, sparks or open flame.

Substances to Avoid
Oxidizers, Acids, Alkalis

Decomposition Products
Carbon Monoxide and Carbon dioxide.

Hazardous Polymerization
Will not occur.

Reactions with Air and Water
May form peroxides in the presence of air.

SECTION 11: TOXICOLOGICAL INFORMATION

PRODUCT INFORMATION

Product Summary
No additional toxicology information is available for this material. (See Component Toxicity Information).

COMPONENT INFORMATION

Diethylene Glycol Monoethyl Ether 111-90-0

Acute Toxicity - Lethal Doses

LD50 (Oral)	Rat	5400 MG/KG
LD50 (Skin)	Rabbit	9.0 G/KG

Irritation

Skin
Slight skin irritant.

Eye
Moderate eye irritant.

Repeated Dose Toxicity
In a two year drinking water study with rats and mice, no adverse effects were observed at 1% and 5%, respectively.

Carcinogenicity
Not listed by IARC, NTP, OSHA or EPA.

2-Ethoxyethanol 110-80-5

Acute Toxicity - Lethal Doses

LC50 (Inhl)	Guinea Pig	3000 PPM 4 HOURS
LD50 (Oral)	Rat	2800 MG/KG
LD50 (Skin)	Rabbit	3.35 G/KG

Irritation

Eye
Slight eye irritant.

Repeated Dose Toxicity
Repeated oral or inhalation exposures can cause effects in the testes, thymus, kidneys, brain, and hematopoietic tissues.

Reproductive Effects
Acute or repeated oral, dermal, or inhalation exposures can cause reproductive toxicity and developmental effects.

- ***Ethylene glycol 107-21-1***

Acute Toxicity - Lethal Doses
LC50 (Inhl) Rat 10,876 MG/KG
LD50 (Oral) Rat 5890 - 13,400 MG/KG BWT
Mouse 5500 MG/KG
NOAEL Rabbit > 3549 MG/KG BWT (SKIN)

Irritation

Skin
May be irritating to the skin. Not expected to be a sensitizer. No significant signs or symptoms indicative of any health hazard are expected to occur as a result of skin absorption exposure.

Eye
May cause minor eye irritation. Effects of eye irritation are reversible.

Sensitization
Not expected to be a sensitizer.

Target Organ Effects
Liver. Kidneys.

Repeated Dose Toxicity
If exposures are sufficiently high to cause accumulation of calcium oxalate crystals, kidney pathology may occur. In male rats, crystal nephropathy has been seen after dietary administration of 500 mg/kg/day bwt for 16 weeks, whereas no

effects were seen in rats that ingested 200 mg/kg/day bwt for 2 years or in several animal species that inhaled 12 mg/m3 for 3 months . Human exposures at occupational relevant concentrations are unlikely to cause crystal nephropathy.

Reproductive Effects
No evidence of adverse effects on reproductive organs or fertility in rats and rabbits have occurred from ethylene glycol exposure. Mice exposed to doses considerably higher than those associated with developmental effects or kidney effects in rats exhibited reduced number of litters and smaller litters. No reproductive effects expected from human exposures.

Developmental Effects
Doses of ethylene glycol that result in high levels of the metabolite glycolic acid induce developmental/teratogenic effects in rats and mice, although at doses greater than those associated with kidney effects in rats. Human exposure is not expected to generate sufficient levels of glycolic acid; therefore, no developmental effects are expected in humans.

Genetic Toxicity
Negative for genotoxicity both in vitro and in vivo tests.

Carcinogenicity
Ethylene glycol was not carcinogenic in two year studies in rats and mice. This material is not classified as a carcinogen. Not listed by IARC, NTP, OSHA or EPA.

Other Information
Human acute toxicity has three recognized stages: Stage 1. (0.5 to 12 hours post ingestion) may include inebriation, nausea and vomiting, metabolic acidosis, and CNS depression. Stage 2. (12-24 hours) cardiopulmonary effects include tachycardia, hypertension, severe metabolic acidosis with hyperventilation, hypoxia, congestive heart failure and adult respiratory distress syndrome. Stage 3. (24-72 hours) renal failure. Ethylene glycol may also produce a local irritation effect on the digestive system, and cause pain and bleeding.

SECTION 12: ECOLOGICAL INFORMATION

PRODUCT INFORMATION

Ecotoxicity
This material is highly soluble in water. Limited toxicity tests and models indicate this material should exhibit low toxicity to aquatic organisms. The odor and flavor of this material may attract some wildlife and cause them to consume spilled material. See component summary.

Environmental Fate and Pathway
This material will biodegrade relatively rapidly in both soil and water, and will not persist in the environment. Due care should be taken to avoid accidental releases to aquatic or terrestrial systems. See component summary.

COMPONENT INFORMATION

Diethylene Glycol Monoethyl Ether 111-90-0

Ecotoxicity
This material is expected to have low toxicity to aquatic species. However, due caution should be exercised to prevent the accidental release of this material to the environment.

Acute toxicity to fish
LC50 / 24 HOUR goldfish > 5,000 mg/l
LC50 / 96 HOUR fathead minnow 26,500 mg/l

Environmental Fate and Pathway
Expected to have high mobility in soils. Volatilization from dry soil surfaces is expected. While this material may evaporate into the air from dry soil, it is unlikely to evaporate from moist soil or water. This material is expected to exist solely as a vapor in the ambient atmosphere. The vapor-phase of this material is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals and ozone.

Persistance and Degradability

Biodegradation: Incubation of diethylene glycol monoethyl ether for 5, 10, and 20 days without an acclimation period resulted in theorectical BOD values or 5, 31, and 48%, respecitively. This material is expected to be readily biodegradable.

Bioaccumulation: BCF = 0.2 This material is not expected to bioaccumulate.

2-Ethoxyethanol 110-80-5

Ecotoxicity
This material is not harmful or toxic to fish.

Acute toxicity to fish
LC50 / 24 HOUR goldfish > 5,000 mg/l

LC50 / 96 HOUR bluegill. > 10,000 mg/l

Environmental Fate and Pathway
Expected to have high mobility in soils. Volatilization from dry soil surfaces is expected. Not likely to adsorb to suspended solids and sediment in water. This material is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase is degraded in the atmosphere by reaction with photochemically produced hydroxyl radicals.

Persistance and Degradability
Biodegradation: This material is expected to be readily biodegradable.
Bioaccumulation: 0.34 This material is not expected to bioaccumulate.

Ethylene glycol 107-21-1

Ecotoxicity
Laboratory toxicity tests have indicated that EG is not significantly toxic to fish and aquatic invertebrates, although amphibians such as toads and frogs may be more sensitive. Wildlife species are more susceptible to ethylene glycol since mammals and birds do not readily metabolize this material. The odor and flavor of EG may attract some wildlife and cause them to consume spilled material.

Acute toxicity to fish
LC50 / 96 HOUR rainbow trout. 22,810 mg/l
LC50 / 96 HOUR fathead minnow 49,000 mg/l
Summary: This material is not harmful or toxic to fish.

Acute toxicity to aquatic invertebrates
EC50 / 48 HOUR Daphnia magna. 41,000 mg/l
EC50 / 48 HOUR daphnia 10,000 mg/l
Summary: This material is not harmful or toxic to aquatic invertebrates.

Toxicity to aquatic plants
Toxicity Threshold / 7 DAY blue green algae. 2,000 mg/l
Summary: This material is not harmful or toxic to algae or higher aquatic plants.

Toxicity to microorganisms
Toxicity Threshold / 16 HOUR bacteria. > 10,000 mg/l

Chronic toxicity to fish
LC50 / 12 DAY rainbow trout. 20,403 mg/l

Chronic toxicity to aquatic invertebrates
LC50 / 7 DAY daphnia 30,461 mg/l

Environmental Fate and Pathway
Mobile in soil. Not expected to volatilize from surface waters or soils. Not likely to adsorb to suspended solids and sediment in water. Environmental half-life of 0.35 to 24 days in soil, air, surface and ground water. Not expected to undergo hydrolysis. Undergoes photooxidation with hydroxyl radicals in air with a half-life of 8.3 to 83 hours.

Persistance and Degradability
Stability in Water: Ethylene glycol is highly soluble in water.
Stability in Soil: Models estimate that EG will preferentially partition to water versus air or soil. Ethylene glycol biodegrades rapidly in soil and water, and will not persist in the environment.
Biodegradation: Reported biodegradation studies show ethylene glycol with 97% biodegradation after 20 days, and 96% biodegradation after 28 days. Biodegradable under aerobic conditions.
Bioaccumulation: BCF = 0.21 - 0.61 (crawfish) BCF = 10.0 (fish) This material is not expected to bioaccumulate.

SECTION 13: DISPOSAL CONSIDERATIONS

Dispose of all waste and contaminated equipment in accordance with all applicable federal, state and local health and environmental regulations. Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. The materials resulting from clean-up operations may be hazardous wastes and therefore, subject to specific regulations.

SECTION 14: TRANSPORT INFORMATION

Special Requirements
If you reformulate or further process this material, you should consider re-evaluation of the regulatory status of the components listed in the composition section of this sheet, based on final composition of your product.

Proper Shipping Name Combustible liquid, n.o.s. (Diethylene Glycol Monoethyl Ether)

ID No. NA1993

Hazard Class Combustible Liquid

PG III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

SECTION 15: REGULATORY INFORMATION

Material Safety Data Sheet

GLYCOL ETHER DE

Regulatory Status
This product and its components are listed, or exempt from listing, on the following:

Country	Inventory
Australia	AICS
Canada	DSL
China	IECS
European Union	EINECS
Japan	ENCS
Korea	ECL
Philippines	PICCS
United States	TSCA
New Zealand	NZIoC

If identified components of this product are listed under the TSCA 12(b) Export Notification rule, they will be listed below.

SARA 302/304

Component	TPQ	RQ
2-Ethoxyethanol		1000 lbs.
Ethylene glycol		5000 lbs.

SARA 311/312
Based upon available information, this material is classified as the following health and/or physical hazards according to Section 311 & 312:

Immediate (Acute) Health Hazard.

Delayed (Chronic) Health Hazard.

Fire Hazard.

SARA 313
This product contains the following chemicals subject to the reporting requirements of SARA Title III, Section 313 and 40 CFR 372:

Component	Reporting Threshold
2-Ethoxyethanol	1.0%
Ethylene glycol	1.0%

State Reporting

Known to the **State of California** to cause birth defects.
2-Ethoxyethanol 110-80-5

Known to the **State of California** to cause reproductive toxicity in males.
2-Ethoxyethanol 110-80-5

This product contains the following chemicals regulated by **New Jersey's** Worker and Community Right to Know Act:
2-Ethoxyethanol 110-80-5
Ethylene glycol 107-21-1

This product contains the following chemicals regulated by **Massachusetts'** Right to Know Law:
2-Ethoxyethanol 110-80-5
Ethylene glycol 107-21-1

This product contains the following chemicals regulated by **Pennsylania's** Right to Know Act:
2-Ethoxyethanol 110-80-5
Ethylene glycol 107-21-1

SECTION 16: OTHER INFORMATION

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DISCLAIMER OF RESPONSIBILITY

The information on this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, expressed or implied, regarding its correctness. Some information presented and conclusions drawn herein are from sources other than direct test data on the substance itself. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with handling, storage, use, or disposal of this product. If the product is used as a component in another product, this MSDS information may not be applicable.

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