Material Safety Data Sheet

1. Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name:</th>
<th>Ethyl Chloride Spray BP</th>
<th>Trade Name:</th>
<th>Ethyl Chloride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Use:</td>
<td>Many</td>
<td>Synonym:</td>
<td>R160, chloroethane, monochloroethane</td>
</tr>
<tr>
<td>Chemical Name:</td>
<td>Ethyl Chloride</td>
<td></td>
<td>hydrochloric ether, muriatic ether</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>kelene, chelene, narcotile, chloryl</td>
</tr>
<tr>
<td>Chemical Formula:</td>
<td>C₂H₅Cl</td>
<td>Chemical Family:</td>
<td>Haloalkanes</td>
</tr>
</tbody>
</table>

*Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier TKM Pharma sales representative.

2. Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>% (VOL)</th>
<th>CAS Number</th>
<th>LD₅₀</th>
<th>LC₅₀</th>
<th>TLV-TWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl chloride BP Spray</td>
<td>100</td>
<td>75-00-3</td>
<td>N/R</td>
<td>160g/M3</td>
<td>1000 ppm</td>
</tr>
</tbody>
</table>

3. Hazards Identification

Emergency Overview

DANGER! Flammable liquid and gas under pressure. Can form explosive mixtures with air. May cause anesthetic effects. May irritate eyes, skin, and mucous membranes. May cause frostbite. Harmful if inhaled or absorbed through the skin. May cause liver and kidney damage. Causes cancer in laboratory animals. Self-contained breathing apparatus may be required by rescue workers.

Threshold Limit Value: TLV-TWA Data from 2004 Guide to Occupational Exposure Values (ACGIH). TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

Effects of a Single (Acute) Overexposure:

Inhalation: Overexposure may cause signs of inebriation, analgesia, dizziness, abdominal cramps, in coordination, vomiting, headache, and cough; additionally may cause kidney and liver damage. High concentrations may result in respiratory tract irritation, experienced as chest discomfort with cough, and cardiac arrest. Lack of oxygen can kill.

Skin Contact: Exposure to liquid may cause frostbite.

routes of exposure: Absorbed through skin. Inhalation.

Skin Absorption: Prolonged or widespread skin contact with the liquid may result in the absorption of harmful
**SWALLOWING:** Not a likely route of exposure. This product is a gas at normal temperature and pressure, but may cause frostbite of the lips and mouth.

**EYE CONTACT:** Exposure to gas may cause slight irritation. Exposure to liquid may cause freezing. Amount of material.

**EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:**

**CARCINOGENIC EFFECTS:** Classified A3 (Proven for animal.) by ACGIH. 3 (Not classifiable for human.) by IARC. Causes damage to the following organs: kidneys, liver, eyes. May cause damage to the following organs: mucous membranes, skin.

**OTHER EFFECTS OF OVEREXPOSURE:** None known.

**MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:** Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

**SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION:** None currently known

**CARCINOGENICITY:** Classified A3 (Proven for animal.) by ACGIH. 3 (Not classifiable for human.) by IARC.

### 4. First Aid Measures

**INHALATION:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

**SKIN CONTACT:** For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of exposure, remove contaminated clothing while showering with warm water. Call a physician.

**SWALLOWING:** This product is a gas at normal temperature and pressure.

**EYE CONTACT:** For contact with the liquid, immediately flush eyes thoroughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

**NOTES TO PHYSICIAN:** This material may be a cardiac sensitizer; avoid the use of epinephrine. There is no specific antidote, and treatment of overexposure should be directed at the control of symptoms and the clinical condition.

### 5. Fire Fighting Measures

**FLAMMABLE:** Yes. **IF YES, UNDER WHAT CONDITIONS?** See Unusual Fire and Explosion Hazards

**FLASH POINT:** CLOSED CUP: -50°C (-58°F). (Tag) **AUTOIGNITION** 519°C (966.2°F)

**TEST METHOD**

**FLASH POINT**

<table>
<thead>
<tr>
<th>Test Method</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLOSED CUP</td>
<td>-50°C (-58°F) (Tag)</td>
</tr>
<tr>
<td>OPEN CUP</td>
<td>-43°C (-45.4°F) (Tag)</td>
</tr>
</tbody>
</table>

**TEMPERATURE**

**FLAMMABLE LIMITS**

<table>
<thead>
<tr>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.8</td>
<td>15.4</td>
</tr>
</tbody>
</table>

**IN AIR, % by volume:**

**EXTINGUISHING MEDIA:** CO2, dry chemical, water spray or fog.

**SPECIAL FIRE FIGHTING PROCEDURES:**

**DANGER!** Evacuate all personnel from danger area. Immediately cool cylinders with water spray from maximum distance taking care not to extinguish flames. Remove ignition source if without risk. If flames are accidentally extinguished, explosive re-ignition may occur; therefore, appropriate measures should be taken; e.g., total evacuation. Reapproach with extreme caution. Use self-contained breathing apparatus. Stop flow of gas if without risk while continuing cooling water spray. Remove all containers from area if without risk. Allow fire to burn out.
Flammable gas. Forms explosive mixtures with air and oxidizing agents. Container may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Vapours form from this product and may travel or be moved by air currents ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharges, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with approved device. No part of a container should be subjected to temperature higher than 52 C. Most containers are provided with a pressure relief device designed to vent contents when they are exposed to elevated temperature.

HAZARDOUS COMBUSTION PRODUCTS:
These products are carbon oxides (CO, CO2), halogenated compounds (phosgene and hydrochloric acid).

SENSITIVITY TO IMPACT: Avoid impact against container.
SENSITIVITY TO STATIC DISCHARGE: Possible.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

DANGER!
Flammable, high-pressure gas. Forms explosive mixtures with air. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce gas with fog or fine water spray. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Flammable gas may spread from leak. Before entering area, especially confined areas, check atmosphere with an appropriate device.

WASTE DISPOSAL METHOD:
Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, provincial, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:

Flammable liquid and gas under pressure. Do not get liquid or vapours in eyes, on skin, or clothing. Safety showers and eyewash fountains should be immediately available. Use only in a closed system. Use piping and equipment adequately designed to withstand pressures to be encountered. Use only spark-proof tools and explosion-proof equipment. Keep away from heat, sparks, and open flame.

May form explosive mixtures with air.
Ground all equipment. Store and use with adequate ventilation at all times. Close valve after each use; keep closed even when empty.

Prevent reverse flow.
Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder.

When returning cylinder to supplier,
be sure valve is closed, then install valve outlet plug tightly.

Never work on a pressurized system.
If there is a leak, close the cylinder valve. Vent the system down in a safe and environmentally sound manner in compliance with all federal, provincial, and local laws; then repair the leak.

Never place a compressed gas cylinder where it may become part of an electrical circuit.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST: Explosion-proof, corrosion resistant, forced draft fume hood is preferred.
MECHANICAL (general): Inadequate.
SPECIAL: Use only in a closed system.
OTHER: See SPECIAL.
PERSONAL PROTECTION:

RESPIRATORY PROTECTION: Use respirable fume respirator or air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below TLV. Select in accordance with the provincial regulations or guidelines. Selection should also be based on the current CSA standards Z94.4, "Selection, care and use of respirators". Respirators should be approved by NIOSH and MSHA.

SKIN PROTECTION: Neoprene gloves.

EYE PROTECTION: Wear safety glasses when handling cylinders.

Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Cuffless trousers should be worn outside the shoes. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines.

9. Physical and Chemical Properties

PHYSICAL STATE: Gas. (Compressed Gas)
FREEZING POINT: -141.5°C (-222.7°F)
PH: Not available.
BOILING POINT: 12.3°C (54.1°F)
VAPOUR PRESSURE: 134.4 kPa (20°C)
MOLECULAR WEIGHT: 46.07 g/mole
SPECIFIC GRAVITY:
LIQUID (Water = 1)
0.898 @ 20/4°C
SOLUBILITY IN WATER, Slight. Slowly hydrolyses.
VAPOUR (Air = 1)
SPECIFIC GRAVITY: 2.23
EVAPORATION RATE: >1 compared to
(Butyl Acetate=1):
% VOLATILES BY 100% (v/v).
COEFFICIENT OF WATER:
OLI DISTRIBUTION
Not available.
Not available.
Not available.
ODOUR THRESHOLD: Not applicable.
APPEARANCE & ODOUR: Colourless.

10. Stability and Reactivity

STABILITY: The product is stable.
CONDITIONS OF CHEMICAL INSTABILITY: Not available.
INCOMPATIBILITY (materials to avoid): Water, oxidizing agents, sodium, potassium, calcium, aluminum, zinc and magnesium.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or burning may produce Phosgene/hydrochloric acid.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS OF REACTIVITY: None known.

11. Toxicological Information: See section 3.

12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. The components of this mixture are not listed as marine pollutants by TDG Regulations.

13. Disposal Considerations

WASTE DISPOSAL
METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

14. Transport Information

TDG/IMO SHIPPING
NAME: Ethyl chloride

HAZARD IDENTIFICATION #: UN1037    PACKING GROUP : I (49 CFR 173.322)
PRODUCT RQ: 100 L
SHIPPING LABEL(s): Flammable gas
PLACARD (when required): Flammable gas

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, non-ventilated compartment of vehicle can present serious safety hazards.

15. Regulatory Information
The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, provincial, and local regulations.

WHMIS (Canada) CLASS A: Compressed gas.
CLASS B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (VERY TOXIC).

International Regulations
EINECS Not available.
DSCL (EEC) R40- Possible risks of irreversible effects.

International Lists No products were found.

16. Other Information
MIXTURES:
When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist, or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

HAZARD RATING SYSTEM: HMIS RATINGS:
HEALTH 2 *
FLAMMABILITY 4
PHYSICAL HAZARD 0
*An Asterisk used in conjunction with HMIS health hazards ratings designates a carcinogenic or reproductive hazard.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:
THREADED: CGA-300
PIN-INDEXED YOKE: Not available.
ULTRA-HIGH-INTEGRITY CONNECTION: Not available.
Use the proper CGA connections.

DO NOT USE ADAPTERS. Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 listed below.

AV-1 Safe Handling and Storage of Compressed Gas
P-1 Safe Handling of Compressed Gases in Containers
P-14 Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmosphere
SB-2 Oxygen-Deficient Atmospheres
V-1 Compressed Gas Cylinder Valve Inlet and Outlet Connections
V-7 Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures
---Handbook of Compressed Gases, Fourth Edition

PREPARATION INFORMATION:
DATE:  20/12/2007
DEPARTMENT: Safety and Environmental Services

The opinions expressed herein are those of qualified experts within Multico Exports. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Multico Exports, it is the user's obligation to determine the conditions of safe use of the product.

Multico Exports requests the users of this product to study this Material Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should
(1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information,
(2) furnish this same information to each of its customers for the product, and
(3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

Prepared By:
TKM PHARMA
1-9-1126
AZAMABAD
HYDERABAD – 500 020
ANDHRA PRADESH
INDIA

Phone : + 91 40 27615002
       +91 40 27656957
Fax :    +91 40 27674042
e-mail: reach@tkmpharma.com