MATERIAL SAFETY DATA SHEET

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
959 ROUTE 46 EAST
PARSIPPANY, NEW JERSEY USA 07054-0624 OR

EMERGENCY CONTACT:
CHEMTREC 1-800-424-9300

INFORMATION CONTACT:
WHITBY, ONTARIO, CANADA L1N 5R9
(USA) 973-257-1100
(EDMONTON) 780-471-4036

SUBSTANCE: METHYLAL

TRADE NAMES/SYNONYMS:
DIMETHOXYMETHANE; DIMETHYLFORMAL; METHYL FORMAL; FORMAL;
FORMALDEHYDE DIMETHYLACETAL; METHYLENE DIMETHYL ETHER; ANESTHENYL;
DIMETHYL FORMAL; METHOXYMETHYL METHYL ETHER; STCC 4908222; UN 1234; M-222;
MAT14800; RTECS PA8750000

CHEMICAL FAMILY: ethers, aliphatic

CREATION DATE: Jan 24 1989
REVISION DATE: Mar 22 2001

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS
SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=2

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: volatile liquid
ODOR: sweet odor
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, central nervous system depression
PHYSICAL HAZARDS: Flammable liquid and vapor. Vapor may cause flash fire. May form peroxides during prolonged storage.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, tearing, vomiting, headache, drowsiness, symptoms of drunkenness, coma
LONG TERM EXPOSURE: same as effects reported in short term exposure
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: same as effects reported in short term exposure
EYE CONTACT:

SHORT TERM EXPOSURE: irritation

LONG TERM EXPOSURE: no information is available

INGESTION:

SHORT TERM EXPOSURE: nausea, stomach pain, drowsiness

LONG TERM EXPOSURE: no information is available

CARCINOGEN STATUS:

OSHA: No

NTP: No

IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

SECTION 5 FIRE FIGHTING MEASURES
**FIRE AND EXPLOSION HAZARDS:** Severe fire hazard. Moderate explosion hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive.

**EXTINGUISHING MEDIA:** alcohol resistant foam, carbon dioxide, regular dry chemical, water, alcohol resistant foam

Large fires: Use alcohol-resistant foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

**FLASH POINT:** 0 F (-18 C) (CC)

**LOWER FLAMMABLE LIMIT:** 2.2%

**UPPER FLAMMABLE LIMIT:** 13.8%

**AUTOIGNITION:** 459 F (237 C)

**FLAMMABILITY CLASS (OSHA):** IB

**SECTION 6 ACCIDENTAL RELEASE MEASURES**

**OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Remove sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep
out of low areas.

SECTION 7 HANDLING AND STORAGE


SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

METHYLAL:

METHYLAL (DIMETHOXYMETHANE):

1000 ppm (3100 mg/m3) OSHA TWA
1000 ppm ACGIH TWA
1000 ppm (3100 mg/m3) NIOSH recommended TWA 10 hour(s)

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.
**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

**2200 ppm**

Any supplied-air respirator.

Any self-contained breathing apparatus with a full facepiece.

**Escape -**

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any appropriate escape-type, self-contained breathing apparatus.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

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**SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**

**PHYSICAL STATE:** liquid

**COLOR:** colorless

**PHYSICAL FORM:** volatile liquid

**ODOR:** sweet odor

**TASTE:** pungent taste

**MOLECULAR WEIGHT:** 76.11

**MOLECULAR FORMULA:** C3-H8-O2

**BOILING POINT:** 111 F (44 C)

**FREEZING POINT:** -157 F (-105 C)

**VAPOR PRESSURE:** 330 mmHg @ 20 C

**VAPOR DENSITY (air=1):** 2.63
SPECIFIC GRAVITY (water=1): 0.8669

WATER SOLUBILITY: 33% @ 20 C

PH: Not available

VOLATILITY: Not available

ODOR THRESHOLD: Not available

EVAPORATION RATE: Not available

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

SOLVENT SOLUBILITY:

Soluble: alcohol, ether, hydrocarbons

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: May form explosive peroxides. Avoid prolonged storage or contact with air, light or storage and use above room temperature.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

INCOMPATIBILITIES: acids, halo carbons, oxidizing materials

HAZARDOUS DECOMPOSITION:

Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION
METHYLAL:

IRRITATION DATA:
100 ul eyes-rabbit moderate

TOXICITY DATA:
15000 ppm inhalation-rat LC50; 5708 mg/kg oral-rabbit LD50

LOCAL EFFECTS:
Irritant: inhalation, skin, eye

ACUTE TOXICITY LEVEL:
Slightly Toxic: inhalation, ingestion

TARGET ORGANS: central nervous system

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: respiratory disorders, skin disorders and allergies

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 6990000 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (Pimephales promelas)

ENVIRONMENTAL SUMMARY:
Relatively non-toxic to aquatic life.

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001, D003.
SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Methylal

ID NUMBER: UN1234

HAZARD CLASS OR DIVISION: 3

PACKING GROUP: II

LABELING REQUIREMENTS: Flammable liquid

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.


SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):

ACUTE: Yes

CHRONIC: No

FIRE: Yes
REACTIVE: Yes
SUDDEN RELEASE: No


STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: B

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED):

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<tr>
<td>F</td>
<td>Highly Flammable</td>
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<td>Xi</td>
<td>Irritant</td>
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DANGER/HAZARD SYMBOL:

EC RISK AND SAFETY PHRASES:

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<tr>
<td>R11</td>
<td>Highly flammable.</td>
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<td>R19</td>
<td>May form explosive peroxides.</td>
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<td>R36</td>
<td>Irritating to eyes.</td>
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<tr>
<td>R37</td>
<td>Irritating to respiratory system.</td>
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<tr>
<td>R38</td>
<td>Irritating to skin.</td>
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<tr>
<td>S 2</td>
<td>Keep out of reach of children.</td>
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<td>S18</td>
<td>Handle and open container with care.</td>
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<td>S24</td>
<td>Avoid contact with skin.</td>
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<tr>
<td>S25</td>
<td>Avoid contact with eyes.</td>
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S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 46 If swallowed, seek medical advice immediately and show this container or label.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL): Not determined.

CANADA INVENTORY (NDSL): Not determined.

SECTION 16 OTHER INFORMATION

MSDS SUMMARY OF CHANGES

SECTION 3 HAZARDS IDENTIFICATION
SECTION 7 HANDLING AND STORAGE
SECTION 14 TRANSPORT INFORMATION
SECTION 15 REGULATORY INFORMATION

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