IDENTIFICATION

MSDS Record Number: 5617923
Product Name(s): GLYOXAL 40% IN WATER
Product Identification: MSDS NUMBER: G7378
PRODUCT CODE: M834
C.A.S. NUMBER: 107-22-2
Date of MSDS: 2006-11-10
Currency Note: This MSDS was acquired from the supplier on 2007-09-06.

MANUFACTURER/SUPPLIER INFORMATION

Company: MALLINCKRODT BAKER INC

MATERIAL SAFETY DATA

Effective Date: 11/10/06

CHEMTREC: 800-424-9300 (USA)
703-527-3887 (Outside USA & CANADA)
CANUTEC: 613-996-6666

Emergency Telephone Number: 908-859-2151

NOTE: Use CHEMTREC and CANUTEC phone numbers only in the event of a chemical emergency.

All non-emergency questions should be directed to Customer Service
(1-800-582-2537) for assistance.

J. T. BAKER

GLYOXAL 40% IN WATER

1. Product Identification

Synonyms: Glyoxal, 40% aqueous; Aerotex glyoxal 40; ethanediol solution

CAS No: 107-22-2
Molecular Weight: 58.04
Chemical Formula: C2H2O2
2. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No</th>
<th>Percent</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanediol</td>
<td>107-22-2</td>
<td>40%</td>
<td>Yes</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>60%</td>
<td>No</td>
</tr>
</tbody>
</table>

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

<table>
<thead>
<tr>
<th>Health Rating:</th>
<th>2 - Moderate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability Rating:</td>
<td>1 - Slight</td>
</tr>
<tr>
<td>Reactivity Rating:</td>
<td>1 - Slight</td>
</tr>
<tr>
<td>Contact Rating:</td>
<td>2 - Moderate</td>
</tr>
<tr>
<td>Lab Protective Equip:</td>
<td>GOGGLES; LAB COAT; PROPER GLOVES</td>
</tr>
<tr>
<td>Storage Color Code:</td>
<td>Green (General Storage)</td>
</tr>
</tbody>
</table>

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

Ingestion:
Harmful if swallowed. Specific health effects from ingestion unknown. May cause irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.

Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.

Eye Contact:
Causes irritation, redness, and pain.

Chronic Exposure:
No information found.

Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.

Explosion:
Not considered to be an explosion hazard. Dry glyoxal may explode when mixed with air.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Glyoxal, vapor and aerosol, inhalable fraction:
-ACGIH Threshold Limit Value (TLV): 0.1 mg/m3 SENG, A4 - Not classifiable as a human carcinogen

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general

Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the substance is apparent and engineering controls are not feasible, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear, yellow liquid.</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>110°C (230°F) (aqueous solution)</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild, sour odor.</td>
</tr>
<tr>
<td>Melting Point</td>
<td>15°C (59°F) (crystals or dry powder)</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>Soluble</td>
</tr>
<tr>
<td>Vapor Density (Air=1)</td>
<td>2.0 (crystals or dry powder)</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.27 (40% aqueous solution)</td>
</tr>
<tr>
<td>Vapor Pressure (mm Hg)</td>
<td>220 @ 20°C (68°F) (crystals or dry powder)</td>
</tr>
<tr>
<td>pH</td>
<td>2.1-2.7 (40% aqueous solution)</td>
</tr>
<tr>
<td>% Volatiles by volume @ 21°C</td>
<td>60 (aqueous solution)</td>
</tr>
<tr>
<td>(70°F)</td>
<td></td>
</tr>
<tr>
<td>Evaporation Rate (BuAc=1)</td>
<td>ca. 1 (aqueous solution)</td>
</tr>
</tbody>
</table>

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Peroxide formation not expected in the presence of inhibitors. Dry glyoxal polymerizers quickly on standing, on contact with water (violent reaction), or solvents containing water.

Incompatibilities:
Reacts weakly to acids. Incompatible with strong oxidizing agents, strong bases, silver, copper and iron salts. Corrosive to most metals.

Conditions to Avoid:
11. Toxicological Information

Glyoxal 40% Solution: Oral rat LD50: 7070 mg/kg; Skin rabbit LD50: 10 qm/kg; Irritation Data, rabbit – skin (open Draize): 258 mg, mild.

Glyoxal, crystals or dry powder: Oral rat LD50: 200 mg/kg. Irritation Data, rabbit – skin (open Draize): 545mg, mild; eyes (std Draize): 20mg, severe. Investigated as a mutagen.

\---\Cancer Lists\---

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>NTP Carcinogen---</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Known</td>
</tr>
<tr>
<td>Ethanedial (107-22-2)</td>
<td>No</td>
</tr>
<tr>
<td>Water (7732-18-5)</td>
<td>No</td>
</tr>
</tbody>
</table>

12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations.

Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

\---\Chemical Inventory Status - Part 1\---

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>TSCA</th>
<th>EC</th>
<th>Japan</th>
<th>Australia</th>
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</thead>
<tbody>
<tr>
<td>Ethanedial (107-22-2)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Water (7732-18-5)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

\---\Chemical Inventory Status - Part 2\---

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Korea</th>
<th>DSL</th>
<th>NDSL</th>
<th>Phil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanedial (107-22-2)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Water (7732-18-5)

Ingredient

Federal, State & International Regulations

RQ TPQ List Chemical Catg.

Yes Yes No Yes

Ethanediol (107-22-2)
Water (7732-18-5)

No No No No


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Ingredient

Federal, State & International Regulations

CERCLA 261.33 8(d)

No No Yes

Ethanediol (107-22-2)
Water (7732-18-5)

No No No No

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Chemical Weapons Convention: No
TSCA 12(b): No
SARA 311/312: Acute: Yes Chronic: No
Reactivity: No (Pure / Liquid)

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Australian Hazchem Code: None allocated.
Australian Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings:
Health: 1 Flammability: 0 Reactivity: 0

Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:
*******************************************************************************
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)
G7378

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©2007 Canadian Centre for Occupational Health & Safety
www.ccohs.ca E-mail: clientservice@ccohs.ca Fax: (905) 572-2206 Phone: (905) 572-2981
Mail: 135 Hunter Street East, Hamilton Ontario L8N 1M5