IDENTIFICATION

MSDS Record Number: 5617934
Product Name(s): HEPES
Product Identification: MSDS NUMBER: H0455
PRODUCT CODE: 4018, 4808, 7745, V682
C.A.S. NUMBER: 7365-45-9
Date of MSDS: 2005-11-10
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: 11/10/05
Supercedes: 01/30/03

MSDS MATERIAL SAFETY DATA SHEET

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Emergency Telephone Number: 908-859-2151

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

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.

M A L L I N C K R O D T
J. T. B A K E R

HEPES

1. Product Identification

Synonyms: 4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid;
"Good" buffer; HEPES, Free Acid

CAS No: 7365-45-9
Molecular Weight: 238.31
Chemical Formula: C8H18N2O4S
Product Codes: J.T. Baker:
4018, 4808
Mallinckrodt:
7745, V682

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>Hepes</td>
<td>7365-45-9</td>
<td>90 - 100%</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3. Hazards Identification

Emergency Overview

WARNING! MAY BE HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. Toxicological properties have not been thoroughly investigated.

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

Health Rating: 2 - Moderate
Flammability Rating: 1 - Slight
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:
Mild acidic irritant. Can cause coughing, sneezing, possible breathing difficulty.

Ingestion:
Toxicity information is limited but piperazine and its derivatives are usually only slightly to moderately hazardous. Normal precautions for handling organic compounds with undefined properties should nevertheless be observed and the appearance of any of the usual symptoms of poisoning (abdominal pain, nausea, vomiting, diarrhea) acted upon promptly.

Skin Contact:
Possibly a mild irritant causing local inflammation and soreness, especially on prolonged contact with sensitive areas.

Eye Contact:
Acidic irritant, pain, reddening of the eye tissues.

Chronic Exposure:
No information found.

Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion:
Give several glasses of water to drink to dilute. If large amounts were swallowed, get medical advice.

Skin Contact:
Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact:
Wash thoroughly with running water. Get medical advice.

5. Fire Fighting Measures

Fire:
As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source.

Explosion:
Not considered to be an explosion hazard.

Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide.

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. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. Alternatively, spills can be neutralized with dilute alkali and disposed of as non-hazardous waste.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. 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:
None established.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. 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 work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and
equipment controls are not feasible, a particulate respirator (NIOSH
type N95 or better filters) may be worn. If oil particles (e.g.,
lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH
type R or P filter. For emergencies or instances where the exposure
levels are not known, use a full-face positive-pressure, air-supplied
respirator. WARNING: Air-purifying respirators do not protect workers
in oxygen-deficient atmospheres.

Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Use chemical safety goggles. 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>White powder</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Solubility</td>
<td>40 grams in 100g of water</td>
</tr>
<tr>
<td>Density</td>
<td>No information found.</td>
</tr>
<tr>
<td>pH</td>
<td>No information found.</td>
</tr>
<tr>
<td>% Volatiles by volume @ 21°C</td>
<td>0</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>No information found.</td>
</tr>
<tr>
<td>Melting Point</td>
<td>234 - 238°C (453 - 460°F)</td>
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<tr>
<td>Vapor Density (Air=1)</td>
<td>No information found.</td>
</tr>
<tr>
<td>Vapor Pressure (mm Hg)</td>
<td>No information found.</td>
</tr>
<tr>
<td>Evaporation Rate (BuAc=1)</td>
<td>No information found.</td>
</tr>
</tbody>
</table>

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
May form carbon oxides, nitrogen oxides, and sulfur oxides when heated to
decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational
exposure.

---Cancer Lists---

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>NTP Carcinogen</th>
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<tr>
<td>Hepes (7365-45-9)</td>
<td>No Anticipated</td>
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<table>
<thead>
<tr>
<th>Ingredient</th>
<th>IARC Category</th>
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<tbody>
<tr>
<td>Hepes (7365-45-9)</td>
<td>None</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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<tbody>
<tr>
<td>Hepes (7365-45-9)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
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</table>

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

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Canada</th>
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<tbody>
<tr>
<td>Hepes (7365-45-9)</td>
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---Federal, State & International Regulations - Part 1---

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>SARA 302</th>
<th>SARA 313</th>
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<tbody>
<tr>
<td>Hepes (7365-45-9)</td>
<td>RQ</td>
<td>TPQ</td>
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</table>

---Federal, State & International Regulations - Part 2---

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CERCLA</th>
<th>RCRA-261.33</th>
<th>TSCA-8(d)</th>
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</thead>
<tbody>
<tr>
<td>Hepes (7365-45-9)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Chemical Weapons Convention: No  TSCA 12(b): No  CDTA: No
SARA 311/312: Acute: Yes  Chronic: No  Fire: No  Pressure: No
  Reactivity: No (Pure / Solid)

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

NFFA Ratings:
Health: 1  Flammability: 1  Reactivity: 0

Label Hazard Warning:
WARNING! MAY BE HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.
MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. Toxicological
Properties have not been thoroughly investigated.

Label Precautions:
Avoid breathing dust.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use 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 while removing 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, give large amounts of water to drink. Never give
anything by mouth to an unconscious person. In all cases, get medical
attention.

Product Use:
Laboratory Reagent.

Revision Information:
No Changes.

Disclaimer:
******************************************************************************
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H0455