IDENTIFICATION

MSDS Record Number: 5618600
Product Name(s): SUCCINIC ACID
Product Identification: MSDS NUMBER: S7226
                    PRODUCT CODE: 0346, 2860
Date of MSDS: 2006-03-03
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: 03/03/06
Supersedes: 11/10/05

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MSDS MATERIAL SAFETY DATA SHEET
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.

Emergency Telephone Number: 908-859-2151
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

S U C C I N I C ACID

1. Product Identification
Synonyms: Butanedioic acid; amber acid
CAS No: 110-15-6
Molecular Weight: 118.10
Chemical Formula: HOOCCH2CH2COOH
Product Codes: J.T. Baker: 0346
               Mallinckrodt: 2860
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>Succinic Acid</td>
<td>110-15-6</td>
<td>90 - 100%</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3. Hazards Identification

Emergency Overview

WARNING! CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. EYE IRRITATION MAY BE SEVERE.
SAF-T-DATA(tm) Ratings (Provided here for your convenience)

<table>
<thead>
<tr>
<th>Health Rating:</th>
<th>1 - Slight</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>3 - Severe</td>
</tr>
<tr>
<td>Lab Protective Equip:</td>
<td>GOGGLES &amp; SHIELD; LAB COAT &amp; APRON; VENT HOOD; 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:
Large oral doses may cause irritation to the gastrointestinal tract.

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

Eye Contact:
Causes irritation, redness, and pain. Irritation may be severe.

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. Call a physician.

Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

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

Explosion:
Fine dust dispersed in air in sufficient concentrations, and in the
presence of an ignition source is a potential dust 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. Water spray may be used
to keep fire exposed containers cool.

6. Accidental Release Measures
Remove all sources of ignition. Ventilate area of leak or spill. Wear
appropriate personal protective equipment as specified in Section 8.
Spills: Clean up spills in a manner that does not disperse dust into the
air. Use non-sparking tools and equipment. Reduce airborne dust and
prevent scattering by moistening with water. Pick up spill for recovery
or disposal and place in a closed container.

7. Handling and Storage
Store in a tightly closed container. Protect container from physical
damage. Store in a cool, dry, ventilated area away from sources of heat
or ignition. Isolate from oxidizing materials. Containers of this
material may be hazardous when empty since they retain product residues
(dust, solids); 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
engineering 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 and/or full face shield where dusting or
splashing of solutions is possible. Maintain eye wash fountain and
quick-drench facilities in work area.

9. Physical and Chemical Properties
Appearance:
White crystals.
Odor:
Odorless.
Solubility:
100 g/100 ml water @ 100°C (212°F).

Boiling Point:
235°C (455°F)
Melting Point:
188°C (370°F)
Vapor Density (Air=1):
No information found.
1g/13mL cold water.

- Specific Gravity: 1.57 @ 25C/4C
- PH: 2.7 (0.1 molar solution)
- % Volatiles by volume @ 21C (70F): 0

10. Stability and Reactivity
Stability:
- Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
- May produce acid smoke and irritating fumes when heated to decomposition.
Hazardous Polymerization:
- Will not occur.
Incompatibilities:
- Oxidizers and bases.
Conditions to Avoid:
- Incompatibles.

11. Toxicological Information
Oral rat LD50: 2260 mg/kg; Irritation eye rabbit, standard Draize, 750 ug (severe); Investigated as a mutagen.
---\Cancer Lists\---

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Known</th>
<th>Anticipated</th>
<th>IARC Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Succinic Acid (110-15-6)</td>
<td>No</td>
<td>No</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>
</tr>
</thead>
<tbody>
<tr>
<td>Succinic Acid (110-15-6)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

----\Federal, State & International Regulations - Part 1\----

Korea  DSL  NDSL  Phil.
Succinic Acid (110-15-6)  Yes  Yes  No  Yes
Ingredient | RQ | TPQ | List | Chemical Catg.
--- | --- | --- | --- | ---
Succinic Acid (110-15-6) | No | No | No | No
--- Federal, State & International Regulations - Part 2 -
--- Refined Chemical Regulations Act (RCRA)
--- Toxic Substances Control Act (TSCA)
--- CERCLA
Succinic Acid (110-15-6) | CERCLA 261.33 | 8(d)
--- Chemical Weapons Convention: 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

NFPA Ratings:
--- Health: 2
--- Flammability: 1
--- Reactivity: 0

Label Hazard Warning:
--- WARNING! CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. EYE IRRITATION MAY BE SEVERE.

Label Precautions:
--- Avoid contact with eyes, skin and clothing.
--- Avoid breathing dust.
--- 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. In all cases call a physician.

Product Use:
--- Laboratory Reagent.

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

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