IDENTIFICATION

MSDS Record Number: 5618645
Product Name(s): Tetraethyl Orthosilicate
Product Identification: MSDS NUMBER: T1131
                     PRODUCT CODE: V492
                     C.A.S. NUMBER: 78-10-4
Date of MSDS: 2006-02-22
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: 02/22/06
Supersedes: 07/07/04

MSDS MATERIAL SAFETY DATA SHEET
CHEMTREC: 800-424-9300 (USA)
703-527-3897 (Outside USA & CANADA)
CANUTEC: 613-996-6666

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

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

Tetraethyl Orthosilicate

1. Product Identification
Synonyms: Ethyl Silicate; Silicic Acid, Tetraethyl Ester;
           Tetraethoxyxilsilane
CAS No.: 78-10-4
Molecular Weight: 208.33
Chemical Formula: (C2H5O)4Si
Product Codes: V492

2. Composition/Information on Ingredients
Ingredient | CAS No | Percent | Hazardous
--- | --- | --- | ---
Ethyl Silicate | 78-10-4 | 100% | Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS LIVER, KIDNEYS AND BLOOD.

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

| Health Rating: | 2 - Moderate (Life) |
| Flammability Rating: | 2 - Moderate |
| Reactivity Rating: | 1 - Slight |
| Contact Rating: | 2 - Moderate |
| Lab Protective Equip: | GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER |
| Storage Color Code: | Red (Flammable) |

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Inhalation may result in symptoms and problems similar to ingestion.

Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Anemia and pulmonary, kidney, and liver damage are possible. May cause central nervous system depression. Symptoms may include lethargy, drowsiness, staggering and sleepiness.

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

Eye Contact:
Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain. Exposure to vapors becomes intolerable at concentrations of 3000 ppm.

Chronic Exposure:
No information found.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin or blood disorders, eye problems, or impaired liver, kidney or respiratory/pulmonary function may be more susceptible to the effects of the substance.

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:
Give large amounts of water to drink. Never give anything by mouth to an unconcious 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
5. Fire Fighting Measures

Fire:
Flash point: 40.6°C (106°F) CC
Flammable Liquid and Vapor:
Explosion:
Sealed containers may rupture when heated. Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back.
Fire Extinguishing Media:
Use CO2, foam, dry chemical, water spray or fog for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.
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. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. 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! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.
J. T. Baker SOLUSORB(R) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. 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. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA) The PEL for Tetraethyl Orthosilicate is listed under Ethyl silicate.
-ACGIH Threshold Limit Value (TLV):
10 ppm (TWA) The TLV for Tetraethyl Orthosilicate is listed under Ethyl silicate.
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 work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134).

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
Appearance: Clear, colorless liquid.
Boiling Point: 165 - 166°C (329 - 331°F) Decomposes.
Odor: Melting Point: -77°C (-107°F)
Alcohol odor. Vapor Density (Air=1):
Solubility: 7.22
Practically insoluble in water.
Hydrolyzes in water.
Specific Gravity: Vapor Pressure (mm Hg):
0.933 @ 20°C/4°C 1 @ 20°C (68°F)
pH: Evaporation Rate (BuAc=1):
No information found. 1
% Volatiles by volume @ 21°C (70°F):
99.9

10. Stability and Reactivity
Stability: Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Oxides of carbon and silicon may be formed when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Ethyl silicate can react dangerously with strong oxidizing agents.
Incompatible with alkalis and mineral acids; hydrolyzes slowly and nonviolently under moist alkaline or acidic conditions at ambient temperatures and atmospheric pressures to form silicon dioxide and ethanol. Reacts with water to form a silicone adhesive (a milky-white mass). Causes swelling and hardening of some plastics.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information
For Ethyl Silicate: LD50 Oral Rat: 6270 mg/kg; LD50 Skin Rabbit: 6300 μl/kg. Irritation Data (Std Draize, Rabbit, 500 mg/24H): skin, moderate; eye, mild.

---Cancer Lists---

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>NTP Carcinogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl Silicate (78-10-4)</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 handled as
   hazardous waste and sent to a RCRA approved waste 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
    Ingredient                        TSCA  EC  Japan  Australia
    Ethyl Silicate (78-10-4)          Yes  Yes  Yes  Yes
    --------------------------------
    Chemical Inventory Status - Part 2
    Ingredient                        Korea DSL NDSL Phil.
    Ethyl Silicate (78-10-4)          Yes  No  Yes
    --------------------------------
    Federal, State & International Regulations - Part 1
    Ingredient                        RQ  TPQ  List  Chemical Catg.
    Ethyl Silicate (78-10-4)          No  No  No  No
    --------------------------------
    Federal, State & International Regulations - Part 2
    Ingredient                        CERCLA 261.33  8(d)
    Ethyl Silicate (78-10-4)          No  No  No
    Chemical Weapons Convention: No
    TSCA 12(b): No
    SARA 311/312: Acute: Yes  Chronic: No
    Fire: Yes  Pressure: No
    Reactivity: No (Pure / Liquid)

    Australian Hazchem Code: 3Y
    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: 2  Reactivity: 0
    Label Hazard Warning:
    WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED.
    CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS LIVER,
    KIDNEYS AND BLOOD.
    Label Precautions:
    Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Avoid breathing vapor or mist.
Wash thoroughly after handling.
Label First Aid:
If swallowed, give large amounts of water to drink. Never give anything
by mouth to an unconscious person. If inhaled, remove to fresh air. If
not breathing, give artificial respiration. If breathing is difficult,
give oxygen. 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. In all cases, get medical
attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3, 14.

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