Section 1 - Product and Company Information

Product Name: 6-CAPROLACTAM
Product Number: 21500
Brand: FLUKA
Company: Sigma-Aldrich Canada, Ltd
Address: 2149 Winston Park Drive
          Oakville ON L6H 6J8 CA
Technical Phone: 9058299500
Fax: 9058299292
Emergency Phone: 800-424-9300

Section 2 - Composition/Information on Ingredient

Substance Name: 6-CAPROLACTAM
CAS #: 105-60-2
SARA 313: No

Formula: C6H11NO
RTECS Number: CM3675000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Highly Toxic (USA) Very Toxic (EU).
Harmful if swallowed. Very toxic by inhalation. Irritating to eyes, respiratory system and skin.
Sensitizer. Target organ(s): Nerves.

HMIS RATING
HEALTH: 3*
FLAMMABILITY: 1
REACTIVITY: 1
NFPA RATING
HEALTH: 3
FLAMMABILITY: 1
REACTIVITY: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
257 °F   125 °C   Method: closed cup

EXPLOSION LIMITS
Lower: 1.4 %   Upper: 8 %

AUTOIGNITION TEMP
375 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

SPECIAL REQUIREMENTS
Hygroscopic.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>ACGIH</td>
<td>TWA</td>
<td>5 PPM</td>
</tr>
<tr>
<td>USA</td>
<td>ACGIH</td>
<td>STEL</td>
<td>10 PPM</td>
</tr>
</tbody>
</table>

Remarks: vapor

New Zealand - OEL
Remarks: check ACGIH TLV

| USA      | NIOSH  | TWA   | 1 MG/M3 |
|          |        | STEL  | 3 MG/M3  |

EXPOSURE LIMITS

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>NDS</td>
<td></td>
<td>5 MG/M3</td>
</tr>
<tr>
<td>Poland</td>
<td>NDSCh</td>
<td></td>
<td>15</td>
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<tr>
<td>Poland</td>
<td>NDSP</td>
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Section 9 - Physical/Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>At Temperature or Pressure</th>
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</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Physical State: Solid</td>
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</tr>
<tr>
<td></td>
<td>Color: Colorless</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Form: Crystals</td>
<td></td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>113.16 AMU</td>
<td></td>
</tr>
</tbody>
</table>
pH                      7.0 - 8.5           Concentration: 333 g/l
BP/BP Range             136.0 - 138.0 °C    10 mmHg
MP/MP Range             68 °C
Freezing Point          N/A
Vapor Pressure          < 0.01 mmHg         20 °C
Vapor Density           N/A 3.91 g/l
Saturated Vapor Conc.   N/A
SG/Density              1.02 g/cm3          75 °C
Bulk Density            0.5 - 0.550 kg/l
Odor Threshold          N/A
Volatile%               N/A
VOC Content             N/A
Water Content           N/A
Solvent Content         N/A
Evaporation Rate        N/A
Viscosity               0.008 Pas           80 °C
Surface Tension         N/A
Partition Coefficient   Log Kow: 0.12       25 °C
Decomposition Temp.     N/A
Flash Point             257 °F 125 °C       Method: closed cup
Explosion Limits        Lower: 1.4 %
                        Upper: 8 %
Flammability            N/A
Autoignition Temp       375 °C
Refractive Index        N/A
Optical Rotation        N/A
Miscellaneous Data      N/A
Solubility              Solvent: 0.1 g/ml H2O clear, colorless
N/A = not available

Section 10 - Stability and Reactivity

STABILITY
   Stable: Stable.
   Conditions to Avoid: Hygroscopic.
   Materials to Avoid: Strong oxidizing agents, Strong bases.

HAZARDOUS DECOMPOSITION PRODUCTS
   Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide,
   Nitrogen oxides.

HAZARDOUS POLYMERIZATION
   Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
   Skin Contact: Causes skin irritation.
   Skin Absorption: May be harmful if absorbed through the skin.
   Eye Contact: Causes eye irritation.
   Inhalation: Material is irritating to mucous membranes and upper
   respiratory tract. May be fatal if inhaled.
   Ingestion: Harmful if swallowed.

SENSITIZATION
   Skin: May cause allergic skin reaction.

TARGET ORGAN(S) OR SYSTEM(S)
   Nerves.

SIGNS AND SYMPTOMS OF EXPOSURE
Convulsions. Exposure can cause:

CONDITIONS AGGRAVATED BY EXPOSURE
Epsilon-caprolactam has been reported to cause seizures, nausea, vomiting, dermatitis and low-grade fever in one exposed human. Experiments in laboratory animals showed neuropharmacological properties and produced convulsions, tremors, mydriasis, opisthotonus and salivation. Studies in the cat and rabbit showed cardiovascular and respiratory effects producing an initial increase in blood pressure followed by a decrease in blood pressure and an increased respiratory rate. Workmen exposed to 12 ppm complained of a bitter taste, nervousness, epistaxis, upper respiratory catarrh, flatulence, heartburn, and a heavy feeling in the stomach

TOXICITY DATA

Oral
Rat
1210 mg/kg
LD50
Remarks: Behavioral: Convulsions or effect on seizure threshold.

Inhalation
Rat
300 mg/m3
LC50

Skin
Rat
> 2000 mg/kg
LD50

Oral
Mouse
930 mg/kg
LD50
Remarks: Muscles, Thorax, or Respiration: Dyspnea.
Behavioral: Muscle contraction or spasticity.

Inhalation
Mouse
450 mg/m3
LC50
Remarks: Behavioral: Muscle contraction or spasticity.

Intraperitoneal
Mouse
650 MG/KG
LD50

Subcutaneous
Mouse
750 MG/KG
LD50

Intravenous
Mouse
480 MG/KG
LD50

Skin
Rabbit
1410 UL/KG
LD50

IRRITATION DATA

Skin
Rabbit
500 mg
24H
Remarks: Mild irritation effect

Eyes
Rabbit
20 mg
24H
Remarks: Moderate irritation effect

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that is probably not carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC CARCINOGEN LIST

Rating: Group 4

NTP CARCINOGEN LIST

Rating: No evidence.
Species: Mouse/rat
Route: Feed

ACGIH CARCINOGEN LIST

Rating: A4

CHRONIC EXPOSURE - TERATOGEN

Species: Rabbit
Dose: 3450 MG/KG
Route of Application: Oral
Exposure Time: (6-28D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

CHRONIC EXPOSURE - MUTAGEN

Species: Human
Dose: 1 MMOL/L
Cell Type: fibroblast
Mutation test: DNA inhibition

Species: Human
Dose: 270 MG/L
Cell Type: lymphocyte
Mutation test: Cytogenetic analysis
Species: Human
Dose: 25 MMOL/L
Cell Type: lymphocyte
Mutation test: SLN

Species: Rat
Route: Intraperitoneal
Dose: 580 MG/KG
Mutation test: DNA damage

Species: Rat
Dose: 76 MG/KG
Cell Type: ovary
Mutation test: Body fluid assay

Species: Rat
Route: Inhalation
Dose: 125 MG/M3/10W
Mutation test: sperm

Species: Mouse
Route: Intraperitoneal
Dose: 500 MG/KG
Mutation test: specific locus test

Species: Mouse
Dose: 2500 MG/L
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Mouse
Route: Intraperitoneal
Dose: 580 MG/KG
Mutation test: DNA damage

Species: Hamster
Dose: 100 MG/L
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Hamster
Dose: 8 GM/L
Cell Type: lung
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 125 MMOL/L
Cell Type: ovary
Mutation test: Sister chromatid exchange

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 10 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 10 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Rat
Dose: 10 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Other effects. Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 125 MG/M3/24H
Route of Application: Inhalation
Exposure Time: (76D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Rat
Dose: 473 MG/M3/4H
Route of Application: Inhalation
Exposure Time: (1-5D PREG)
Result: Effects on Embryo or Fetus: Fetal death. Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Species: Rat
Dose: 139 MG/M3/4H
Route of Application: Inhalation
Exposure Time: (6-12D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Species: Rat
Dose: 473 MG/M3/4H
Route of Application: Inhalation
Exposure Time: (60D PRE)
Result: Maternal Effects: Menstrual cycle changes or disorders.

Species: Rabbit
Dose: 2500 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain).

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Section 12 - Ecological Information

No data available.

ACUTE ECOTOXICITY TESTS
Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h
Value: 828.0 - 2,920.0 mg/l

Test Type: EC50 Algae
Species: Selenastrum capricornutum resp.
Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Toxic solids, organic, n.o.s.
UN#: 2811
Class: 6.1
Packing Group: Packing Group II
Hazard Label: Toxic substances.
PIH: Not PIH

IATA
Proper Shipping Name: Toxic solid, organic, n.o.s.
IATA UN Number: 2811
Hazard Class: 6.1
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: Xn
Indication of Danger: Harmful.
R: 20/22-36/37/38
Risk Statements: Harmful by inhalation and if swallowed. Irritating to eyes, respiratory system and skin.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Highly Toxic (USA) Very Toxic (EU).
Risk Statements: Harmful if swallowed. Very toxic by inhalation. Irritating to eyes, respiratory system and skin.
Safety Statements: Do not breathe dust. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. If swallowed, seek medical advice immediately and show this container or label.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.