Section 1 - Product and Company Information

Product Name                       ACETIC ACID, 99.8%
Product Number                     109088
Brand                              ALDRICH
Company                            Sigma-Aldrich
Street Address                     3050 Spruce Street
City, State, Zip, Country          SAINT LOUIS MO 63103 US
Technical Phone:                   314 771 5765
Emergency Phone:                   414 273 3850 Ext. 5996
Fax:                               800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name                          CAS #                 SARA 313
ACETIC ACID                             64-19-7               No

Formula         C2H4O2
Synonyms        Acetic acid (ACGIH;OSHA) * Acetic acid, glacial *
                Acide acetique (French) * Acido acetico (Italian)
                * Azijnzuur (Dutch) * Essigsaeure (German) *
                Ethanoic acid * Ethylic acid * Glacial acetic
                acid * Kyselina octova (Czech) *
                Methanecarboxylic acid * Octowy kwas (Polish) *
                Vinegar acid
RTECS Number:   AF1225000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Combustible (USA) Flammable (EU). Corrosive. 
Causes severe burns. Harmful in contact with skin.
Lachrymator. Target organ(s): Teeth. Kidneys.

HMIS RATING
HEALTH: 3*
FLAMMABILITY: 2
REACTIVITY: 0

NFPA RATING
HEALTH: 3
FLAMMABILITY: 2
REACTIVITY: 0

*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. Do not induce vomiting.

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
104 °F   40 °C   Method: closed cup

EXPLOSION LIMITS
Lower: 4 %   Upper: 19.9 %

AUTOIGNITION TEMP
427 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: 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): Combustible liquid. 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
Cover with dry lime or soda ash, pick up, keep in a closed container, and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

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

STORAGE
Suitable: Keep tightly closed.
Section 8 - Exposure Controls / PPE

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

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.
Other: Faceshield (8-inch minimum).

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

EXPOSURE LIMITS, RTECS

<table>
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<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
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<td>USA</td>
<td>ACGIH</td>
<td>STEL</td>
<td>15 PPM</td>
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<tr>
<td>USA</td>
<td>ACGIH</td>
<td>TWA</td>
<td>10 PPM</td>
</tr>
<tr>
<td>USA</td>
<td>MSHA Standard-air</td>
<td>TWA</td>
<td>10 PPM (25 MG/M3)</td>
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<tr>
<td>USA</td>
<td>OSHA.</td>
<td>PEL</td>
<td>8H TWA 10 PPM (25 MG/M3)</td>
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New Zealand OEL
Remarks: check ACGIH TLV

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
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<td>NIOSH</td>
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<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>15 PPM</td>
</tr>
</tbody>
</table>

Section 9 - Physical/Chemical Properties

Appearance
Physical State: Liquid
Color: Colorless

Property
Value At Temperature or Pressure

Molecular Weight
60.05 AMU

pH
2.4 Concentration: 60.05 g/l

BP/BP Range
117 - 118 °C 760 mmHg

MP/MP Range
16.2 °C

Freezing Point
16.7 °C

Vapor Pressure
11.4 mmHg 20 °C

Vapor Density
2.07 g/l

Saturated Vapor Conc.
N/A

SG/Density
1.06 g/cm3

Bulk Density
N/A

Odor Threshold
N/A

Volatile%
N/A

VOC Content
N/A

Water Content
N/A

Solvent Content
N/A

Evaporation Rate
N/A

Viscosity
N/A

Surface Tension
28.8 mN/m 10 °C

Partition Coefficient
Log Kow: -0.17

Decomposition Temp.
N/A

Flash Point
104 °F 40 °C Method: closed cup

Explosion Limits
Lower: 4 %
Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Conditions to Avoid: Protect from moisture.
Materials to Avoid: Oxidizing agents, Soluble carbonates and phosphates, Hydroxides, Oxides, Metals, Peroxides, Permanganates, Amines, Alcohols.

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

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: Causes burns.
Skin Absorption: Harmful if absorbed through skin.
Eye Contact: Causes burns.
Inhalation: May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Teeth. Kidneys.

SIGNS AND SYMPTOMS OF EXPOSURE
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Ingestion or inhalation of concentrated acetic acid causes damage to tissues of the respiratory and digestive tracts. Symptoms include: hematemesis, bloody diarrhea, edema and/or perforation of the esophagus and pylorus, hematuria, anuria, uremia, albuminuria, hemolysis, convulsions, bronchitis, pulmonary edema, pneumonia, cardiovascular collapse, shock, and death. Direct contact or exposure to high concentrations of vapor with skin or eyes can cause: erythema, blisters, tissue destruction with slow healing, skin blackening, hyperkeratosis, fissures, corneal erosion, opacification, iritis, conjunctivitis, and possible

CONDITIONS AGGRAVATED BY EXPOSURE
Severe, acute pancreatitis may occur after ingestion of
TOXICITY DATA

Oral
Rat
3310 mg/kg
LD50

Inhalation
Mouse
5,620 ppm
LC50

Intravenous
Mouse
525 MG/KG
LD50
Remarks: Behavioral: Convulsions or effect on seizure threshold.

Skin
Rabbit
1060 UL/KG
LD50

IRRITATION DATA

Skin
Human
50 mg
24H
Remarks: Mild irritation effect

Skin
Rabbit
525 mg
Remarks: Open irritation test

Skin
Rabbit
50 mg
24H
Remarks: Mild irritation effect

Eyes
Rabbit
5 mg
30S
Remarks: Rinsed

CHRONIC EXPOSURE - MUTAGEN

Species: Human
Dose: 5 MMOL/L
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Mouse
Route: Skin
Dose: 79279 UG/KG
Mutation test: Unscheduled DNA synthesis

Species: Mouse
Route: Skin
Dose: 1201 MG/KG
Mutation test: Other mutation test systems

Species: Hamster
Dose: 10 MMOL/L
Cell Type: ovary
Mutation test: Cytogenetic analysis

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 700 MG/KG
Route of Application: Oral
Exposure Time: (18D POST)
Result: Effects on Newborn: Behavioral.

Species: Rat
Dose: 400 MG/KG
Route of Application: Intratesticular
Exposure Time: (1D MALE)
Result: Effects on Fertility: Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females).

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Algae
Time: 24 h
Value: 156 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h
Value: 65 mg/l

Test Type: LC50 Fish
Species: Leuciscus idus
Time: 48 h
Value: 410 mg/l

Test Type: LC50 Fish
Species: Cyprinus carpio
Time: 48 h
Value: 49 mg/l

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 79 - 88 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
This combustible material may be burned 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: Acetic acid, glacial [or] Acetic acid solution, [with more than 80 percent acid, by mass]
- UN#: 2789
- Class: 8
- Packing Group: Packing Group II
- Hazard Label: Corrosive
- Hazard Label: Flammable liquid
- PIH: Not PIH

**IATA**
- Proper Shipping Name: Acetic acid, glacial
- IATA UN Number: 2789
- Hazard Class: 8
- Packing Group: II

**Section 15 - Regulatory Information**

**EU DIRECTIVES CLASSIFICATION**
- Symbol of Danger: C
- Indication of Danger: Corrosive.
- R: 10 35
- S: 26 36/37/39 45
- Safety Statements: 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. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**US CLASSIFICATION AND LABEL TEXT**
- Risk Statements: Causes severe burns. Harmful in contact with skin.
- Safety Statements: Keep away from sources of ignition - no smoking. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). 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.

**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
    For R&D use only. Not for drug, household or other uses.

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 2004 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.