1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Acetaldehyde solution
Product Number: W200344
Brand: Aldrich
Supplier: Sigma-Aldrich
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Preparation information: Sigma-Aldrich Corporation

2. HAZARDS IDENTIFICATION

Emergency Overview
OSHA Hazards: Flammable liquid, Carcinogen, Target Organ Effect, Irritant
Target Organs: Nerves, Liver, Heart, Blood, Kidney, Lungs, Cardiovascular system, Central nervous system
GHS Classification:
- Flammable liquids (Category 2)
- Skin irritation (Category 3)
- Eye irritation (Category 2A)
- Carcinogenicity (Category 2)
- Specific target organ toxicity - single exposure (Category 3)
- Respiratory system Acute aquatic toxicity (Category 3)
GHS Label elements, including precautionary statements:
- Signal word: Danger
- Hazard statement(s):
  - H225: Highly flammable liquid and vapour.
  - H316: Causes mild skin irritation.
  - H319: Causes serious eye irritation.
  - H335: May cause respiratory irritation.
  - H351: Suspected of causing cancer.
  - H402: Harmful to aquatic life.
Precautionary statement(s):
- P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- P261: Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
- P281: Use personal protective equipment as required.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula: C2H4O
Molecular Weight: 44.05 g/mol

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>Flam. Lq. 2; H225</td>
<td>50 - 70 %</td>
</tr>
<tr>
<td>Acetaldehyde</td>
<td>Flam. Lq. 1; Eye Irrit. 2; Carc. 2, STOT SE 3; H324, H319, H335, H351</td>
<td>50 - 70 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surfaces. No smoking.

Other hazards:
Lachrymator, Photosensitizer.
6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resaled and kept upright to prevent leakage.

Recommended storage temperatures: 2 - 8 °C
Store under inert gas. Handle and open container with care. Air sensitive. Cool to 0 °C before opening. Metals

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
<td></td>
<td>TWA 1,000 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Respiratory Tract irritation Confirmed animal carcinogen with unknown relevance to humans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>1,000 ppm</td>
<td></td>
<td>1,900 mg/m³</td>
<td>USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1810-1900</td>
</tr>
<tr>
<td>TWA</td>
<td>1,000 ppm</td>
<td></td>
<td>1,900 mg/m³</td>
<td>USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1810-1900</td>
</tr>
<tr>
<td>The value in mg/m³ is approximate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethanol</td>
<td>75-07-7</td>
<td>C</td>
<td>25 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Acetaldehyde</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye &amp; Upper Respiratory Tract irritation Confirmed animal carcinogen with unknown relevance to humans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Potential Occupational Carcinogen See Appendix C See Appendix A

<table>
<thead>
<tr>
<th>TWA</th>
<th>200 ppm</th>
<th>380 mg/m³</th>
<th>USA Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEL</td>
<td>150 ppm</td>
<td>270 mg/m³</td>
<td>USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1810-1900</td>
</tr>
<tr>
<td>TWA</td>
<td>160 ppm</td>
<td>180 mg/m³</td>
<td>USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1810-1900</td>
</tr>
</tbody>
</table>

The value in mg/m³ is approximate.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (USP) or type ABEL (EN 136) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin and body protection
Choose suitable protective clothing. Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form: clear, liquid
Colour: colourless

Safety data

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>no data available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>no data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td>61 - 82 °C (142 - 180 °F)</td>
</tr>
<tr>
<td>Flash point</td>
<td>-1 °C (30 °F) - closed cup</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>no data available</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>no data available</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>7.89 Hpa (5.54 mmHg) at 20 °C (68 °F)</td>
</tr>
<tr>
<td></td>
<td>34.56 Hpa (25.99 mmHg) at 55 °C (131 °F)</td>
</tr>
<tr>
<td>Density</td>
<td>0.882 g/cm³ at 25 °C (77 °F)</td>
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<tr>
<td>Water solubility</td>
<td>no data available</td>
</tr>
</tbody>
</table>

Additional information:

- ADR/ - W200344
- Delivery 08400310-00010 Purchase Order PRISM-10R-011414
- Page 3 of 8

- ADR/ - W200344
- Delivery 08400310-00010 Purchase Order PRISM-10R-011414
- Page 4 of 8


10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
no data available

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity
Oral LD50
no data available

Inhalation LD50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: 2B - Group 2B: Possibly carcinogenic to humans (Acetaldehyde)
NTP: Reasonably anticipated to be a human carcinogen (Acetaldehyde)
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Teratogenicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects
Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion: May be harmful if swallowed.
Skin: May be harmful if absorbed through skin. Causes skin irritation.
Eyes: Causes eye irritation.

Signs and Symptoms of Exposure
Pulmonary edema. Effects may be delayed. Headache, Blurred vision, Unconsciousness

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity
no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1983 Class: 3 Packing group: II
Proper shipping name: Flammable liquids, n.o.s. (Acetaldehyde, Ethanol)

Aidasn - W20344
Delivery 0645635109-000010 Purchase Order PRISM-10R-011414
13. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Carcinogen, Target Organ Effect, Irritant

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>75-07-0</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-17-5</td>
<td>2007-03-01</td>
</tr>
<tr>
<td>75-07-0</td>
<td>2007-07-01</td>
</tr>
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</table>

Pennsylvania Right To Know Components

<table>
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<th>Revision Date</th>
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<tbody>
<tr>
<td>64-17-5</td>
<td>2007-03-01</td>
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<tr>
<td>75-07-0</td>
<td>2007-07-01</td>
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</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
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<tbody>
<tr>
<td>64-17-5</td>
<td>2007-03-01</td>
</tr>
<tr>
<td>75-07-0</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
WARNING: This product contains a chemical known to the State of California to cause cancer.

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>75-07-0</td>
<td>2007-09-28</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

Carc: Carcinogenicity
Eye Irrit.: Eye irritation
Flam. Liq.: Flammable liquids
H224: Extremely flammable liquid and vapour.
H225: Highly flammable liquid and vapour.
H319: Causes serious eye irritation.
H335: May cause respiratory irritation.
H351: Suspected of causing cancer.
STOT SE: Specific target organ toxicity - single exposure

Further information
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