1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Ethanol
Product Number: 459644
Brand: Sigma-Aldrich
Supplier: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5559
Emergency Phone #: (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview
OSHA Hazards
Flammable liquid, Target Organ Effect, Inhant
Target Organs
Nerves, Liver, Heart
GHS Classification
Flammable liquids (Category 2)
Skin irritation (Category 2)
Eye irritation (Category 2B)
Specific target organ toxicity - single exposure (Category 3)
GHS Label elements, including precautionary statements
Pictogram
Signal word
Danger
Hazard statement(s)
H225 Highly flammable liquid and vapour.
H315 + H330 Causes skin and eye irritation.
H335 May cause respiratory irritation.
Precautionary statement(s)
P210 Keep away from heat, sparks, open flames, and hot surfaces. No smoking.
P231 Avoid breathing dust, fume, gas, mist, or vapours. Spray water on spillage.
P305 + P351 + P338 If in eyes: Rinse with large quantities of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Ethyl alcohol
Formula: C₂H₅OH
Molecular Weight: 46.07 g/mol
CAS-No.: EC-No.: index-No.: Concentration
Ethanol
64-17-5 200-576-6 100-002-00-S -

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

5. FIRE-FIGHTING 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 flames, and hot surfaces. No smoking.
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.
Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Physical hazards: 0
NFPA Rating
Health hazard: 2
Fire: 3
Reactivity hazard: 0
Potential Health Effects
Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
Skin: May be harmful if absorbed through skin. Causes skin irritation.
Eyes: Causes eye irritation.
Ingestion: May be harmful if swallowed.
Personal precautions
Use personal protective equipment. Avoid breathing vapors, 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.

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 revealed and kept upright to prevent leakage.

Hygroscopic.

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>TWA</td>
<td>1,000 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
</tr>
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<td></td>
</tr>
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<td></td>
<td></td>
<td>REMARKS</td>
<td>Upper Respiratory Tract irritation Confirmed animal carcinogen with unknown relevance to humans. The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that may not be relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agent is likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>1,000 ppm</td>
<td>USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1919.1000</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>1,000 ppm</td>
<td>USA, Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td></td>
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<tr>
<td>The value in mg/m³ is approximate.</td>
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<tr>
<td></td>
<td></td>
<td>TWA</td>
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<td>USA, NIOSH Recommended Exposure Limits</td>
</tr>
</tbody>
</table>

Personal protective equipment
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) 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 according to appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Impermeable 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 liquid, clear
Colour colourless

Safeguards
pH no data available
Melting point/freezing point
Boiling point 78.3 °C (172.9 °F)
Flash point 14.0 °C (57.2 °F) - closed cup
Ignition temperature 353 °C (665 °F)
Autoignition temperature 365.0 °C (685 °F)
Lower flammability limit 3.0 %V
Upper flammability limit 13 %V
Vapour pressure 59.5 kPa (44.6 mmHg) at 20.0 °C (68.0 °F)
Density 0.789 g/mL at 20 °C (68 °F) 0.786 g/mL at 25 °C (77 °F)
Water solubility completely soluble
Partition coefficient n-octanol/Water no data available
Relative vapour density no data available
Odour no data available
Odour Threshold no data available
Evaporation rate no data available

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
Alkali metals, Ammonia, Oxidising agents, Peroxides
11. TOXICOLOGICAL INFORMATION

**Acute toxicity**

- **Oral LD50**
  - LD50 Oral - 7.06 mg/kg
  - Remarks: Lungs, Throat or Respiration. Other changes.

- **Inhalation LC50**
  - LC50 Inhalation - 10 h - 20000 ppm

- **Dermal LD50**
  - No data available

**Other Information on acute toxicity**
- No data available

**Skin corrosion/irritation**
- Skin - rabbit - Irritating to skin. - 24 h

**Serious eye damage/eye irritation**
- Eyes - rabbit - Mild eye irritation. - 24 h - Draize test

**Respiratory or skin sensitization**
- No data available

**Germl cell mutagenicity**
- No data available

**Carcinogenicity**
- Carcinogenicity - mouse - Oral

**IARC**
- No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**NTP**
- No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

**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**
- Reproductive toxicity - Human - female - Oral
  - Effects on Newborn: Agar score (human only). Effects on Newborn: Other neonatal measures or effects. Effects on Newborn: Drug dependence.
  - No data available

**Teratogenicity**
- No data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
- Inhalation - May cause respiratory irritation.

**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**
- Central nervous system depression, nausea, Damage to the heart. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**
- No data available

**Additional Information**
- RTECS: KQ600003

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**

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: 1170  Class: 3
- Proper shipping name: Ethanol
- Non-returtle Quantity (NRQ): Marine pollutant: No
- Poison Inhalation Hazard: No

**IMDG**
- UN number: 1170  Class: 3
- Proper shipping name: ETHANOL
- Marine pollutant: No

**IATA**
- UN number: 1170  Class: 3
- Proper shipping name: Ethanol

**Packing group II**

EMS-No: F-E, S-D

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16. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, 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
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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

Massachusetts Right To Know Components

<table>
<thead>
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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further Information
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