SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Ethyl Alcohol, pure

Product Number : 459836
Brand : Sigma-Aldrich
Index-No. : 603-002-00-5
CAS-No. : 64-17-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO  63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word : Danger

Hazard statement(s)
H225 : Highly flammable liquid and vapor.
H319 Causes serious eye irritation.

Precautionary statement(s)
P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235 Store in a well-ventilated place. Keep cool.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: Absolute alcohol

Formula: C₂H₆O
Molecular weight: 46.07 g/mol
CAS-No.: 64-17-5
EC-No.: 200-578-6
Index-No.: 603-002-00-5

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethanol</td>
<td>Flam. Liq. 2; Eye Irrit. 2A; H225, H319 Concentration limits: &gt;= 50 %: Eye Irrit. 2A, H319;</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.
SECTION 4: First aid measures

4.1 Description of first-aid measures

**General advice**
Show this material safety data sheet to the doctor in attendance.

**If inhaled**
After inhalation: fresh air.

**In case of skin contact**
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower.

**In case of eye contact**
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

**If swallowed**
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

**Suitable extinguishing media**
Water Foam Carbon dioxide (CO2) Dry powder

**Unsuitable extinguishing media**
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
In the event of fire, wear self-contained breathing apparatus.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.
SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Hygiene measures
Change contaminated clothing. Wash hands after working with substance. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Hygroscopic.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Ingredients with workplace control parameters
<table>
<thead>
<tr>
<th>Component</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 1,000 ppm</td>
<td>USA. Table Z-1-A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,900 mg/m3</td>
<td>Limits for Air</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contaminants (1989</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>vacated values)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA 1,000 ppm</td>
<td>USA. Occupational</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,900 mg/m3</td>
<td>Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 1,000 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td>Confirmed animal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>carcinogen with</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>unknown relevance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>to humans</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA 1,000 ppm</td>
<td>USA. NIOSH</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,900 mg/m3</td>
<td>Recommended</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Exposure Limits</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PEL 1,000 ppm</td>
<td>California</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,900 mg/m3</td>
<td>permissible</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>exposure limits</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>for chemical</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>contaminants (Title</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8, Article 107)</td>
<td></td>
</tr>
</tbody>
</table>

**Derived No Effect Level (DNEL)**

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Routes of exposure</th>
<th>Health effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>950 mg/m3</td>
</tr>
<tr>
<td>Workers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>343mg/kg BW/d</td>
</tr>
<tr>
<td>Workers</td>
<td>Ingestion</td>
<td>Long-term systemic effects</td>
<td>343mg/kg BW/d</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute local effects</td>
<td>1900 mg/m3</td>
</tr>
</tbody>
</table>

**Predicted No Effect Concentration (PNEC)**

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>0.63 mg/kg</td>
</tr>
<tr>
<td>Sea water</td>
<td>0.79 mg/l</td>
</tr>
<tr>
<td>Fresh water</td>
<td>0.96 mg/l</td>
</tr>
<tr>
<td>Fresh water sediment</td>
<td>3.6 mg/l</td>
</tr>
<tr>
<td>Sewage treatment plant</td>
<td>580 mg/l</td>
</tr>
</tbody>
</table>

**8.2 Exposure controls**

**Appropriate engineering controls**

Change contaminated engineering clothing. Wash hands after working with substance.

**Personal protective equipment**

**Eye/face protection**

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

**Skin protection**

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact

Material: butyl-rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min
Material tested: Butoject® (KCL 898)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 120 min
Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

**Body Protection**
Flame retardant antistatic protective clothing.

**Respiratory protection**
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

**Control of environmental exposure**
Do not let product enter drains. Risk of explosion.

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: liquid</td>
</tr>
<tr>
<td></td>
<td>Color: colorless</td>
</tr>
<tr>
<td>b) Odor</td>
<td>alcohol-like</td>
</tr>
<tr>
<td>c) Odor Threshold</td>
<td>0.1 ppm</td>
</tr>
<tr>
<td>d) pH</td>
<td>7.0 at 10 g/l at 20 °C (68 °F)</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: -114 °C (-173 °F)</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>78 °C 172 °F</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>13 °C (55 °F) - closed cup</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>Upper explosion limit: 27.7 %(V)</td>
</tr>
<tr>
<td></td>
<td>Lower explosion limit: 3.1 %(V)</td>
</tr>
<tr>
<td>k) Vapor pressure</td>
<td>57.26 hPa at 19.6 °C (67.3 °F)</td>
</tr>
<tr>
<td>l) Vapor density</td>
<td>1.6</td>
</tr>
<tr>
<td>m) Density</td>
<td>0.789 g/mL at 25 °C (77 °F)</td>
</tr>
<tr>
<td></td>
<td>Relative density</td>
</tr>
<tr>
<td></td>
<td>No data available</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>1,000 g/l at 20 °C (68 °F) - completely miscible</td>
</tr>
</tbody>
</table>
o) Partition coefficient: log Pow: -0.35 at 24 °C (75 °F) - Bioaccumulation is not expected.

p) Autoignition temperature: 363 - 425 °C (685 - 797 °F) at 1,013 hPa

q) Decomposition temperature: Distillable in an undecomposed state at normal pressure.

r) Viscosity: No data available

s) Explosive properties: No data available

t) Oxidizing properties: none

9.2 Other safety information

Conductivity: < 1 µS/cm
Surface tension: 22.31 mN/m at 20 °C (68 °F) - similar to water
Relative vapor density: 1.6

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of hazardous reactions
Risk of explosion/exothermic reaction with:
- hydrogen peroxide
- perchlorates
- perchloric acid
- Nitric acid
- mercury(II) nitrate
- permanganic acid
- Nitriles
- peroxy compounds
- Strong oxidizing agents
- nitrosyl compounds
- Peroxides
- sodium
- Potassium
- halogen oxides
- calcium hypochlorite
- nitrogen dioxide
- metallic oxides
- uranium hexafluoride
- iodides
- Chlorine
- Alkali metals
- Alkaline earth metals
- alkali oxides
- Ethylene oxide
silver
with
Nitric acid
silver compounds
with
Ammonia
potassium permanganate
with
conc. sulfuric acid
Risk of ignition or formation of inflammable gases or vapours with:
halogen-halogen compounds
chromium(VI) oxide
chromyl chloride
Fluorine
hydrides
Oxides of phosphorus
platinum
Nitric acid
with
potassium permanganate

10.4 Conditions to avoid
Warming.
Warming.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 10,470 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - Rat - male and female - 4 h - 124.7 mg/l - vapor

(OECD Test Guideline 403)
Dermal: No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Causes serious eye irritation.
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances: Methanol

**Germ cell mutagenicity**
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: mouse lymphoma cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Test Type: dominant lethal test
Species: Mouse

Application Route: Oral
Method: OECD Test Guideline 478
Result: Positive results were obtained in some in vivo tests.

**Carcinogenicity**
IARC: No ingredient 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 ingredient 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 on OSHA’s list of regulated carcinogens.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

11.2 **Additional Information**
Repeated dose toxicity - Rat - male - Oral - NOAEL (No observed adverse effect level) - 1,730 mg/kg - LOAEL (Lowest observed adverse effect level) - 3,200 mg/kg

RTECS: KQ6300000
irritant effects, respiratory paralysis, Dizziness, narcosis, inebriation, euphoria, Nausea, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence
SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
flow-through test LC50 - Pimephales promelas (fathead minnow) - 15,300 mg/l - 96 h (US-EPA)

Toxicity to daphnia and other aquatic invertebrates
static test LC50 - Ceriodaphnia dubia (water flea) - 5,012 mg/l - 48 h
Remarks: (ECHA)

Toxicity to algae
static test ErC50 - Chlorella vulgaris (Fresh water algae) - 275 mg/l - 72 h (OECD Test Guideline 201)

Toxicity to bacteria
static test IC50 - activated sludge - > 1,000 mg/l - 3 h (OECD Test Guideline 209)

Toxicity to fish (Chronic toxicity)
semi-static test NOEC - Danio rerio (zebra fish) - 250 mg/l - 120 h
Remarks: (ECHA)

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)
semi-static test NOEC - Daphnia magna (Water flea) - 9.6 mg/l - 9 d
Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability
- aerobic - Exposure time 15 d
Result: ca.95 % - Readily biodegradable. (OECD Test Guideline 301E)

Biochemical Oxygen Demand (BOD) 930 - 1,670 mg/g
Remarks: (Lit.)

Theoretical oxygen demand 2,100 mg/g
Remarks: (Lit.)

12.3 Bioaccumulative potential

Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1170   Class: 3   Packing group: II
Proper shipping name: Ethanol
Reportable Quantity (RQ):
   Poison Inhalation Hazard: No

IMDG
UN number: 1170   Class: 3   Packing group: II   EMS-No: F-E, S-D
Proper shipping name: ETHANOL

IATA
UN number: 1170   Class: 3   Packing group: II
Proper shipping name: Ethanol

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
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>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethanol</td>
<td>64-17-5</td>
<td>1993-04-24</td>
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</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethanol</td>
<td>64-17-5</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.ethanol

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
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<tbody>
<tr>
<td>ethanol</td>
<td>64-17-5</td>
<td>2011-05-20</td>
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</tbody>
</table>
SECTION 16: Other information

Further information
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 Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.11 Revision Date: 03/18/2023 Print Date: 07/29/2023