

# MATERIAL SAFETY DATA SHEET

## 1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology  
Standard Reference Materials Program  
100 Bureau Drive, Stop 2300  
Gaithersburg, Maryland 20899-2300

SRM Number: 1847  
MSDS Number: 1847  
SRM Name: Ethanol-Water Solutions  
(Breath-Alcohol Testing Three Levels)

Date of Issue: 15 March 2012

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**Description:** This Standard Reference Material (SRM) is a set of three levels of ethanol in water at a nominal concentrations of 2 %, 6 %, and 25 % by mass. This SRM is intended primarily for use in the calibration of instruments and techniques used for the determination of ethanol in breath. SRM 1847 consists of six 10 mL ampoules, (two ampoules each of the nominal concentrations of 2 %, 6 %, and 25 % by mass) each ampoule contains approximately 10 mL of solution.

**Substance:** Ethanol/Water Solutions

**Other Designations:** Ethyl alcohol; grain alcohol; ethyl hydroxide; ethyl hydrate; algrain; methyl carbinol; cologne spirits; fermentation alcohol; absolute alcohol; UN1170; C<sub>2</sub>H<sub>5</sub>OH.

## 2. HAZARD IDENTIFICATION

**NFPA Ratings (Scale 0–4):** Health = 2 Fire = 3 Reactivity = 0

**Note:** Each of these solutions is a mixture of ethanol and water. This MSDS contains health and safety information for ethanol.

**Major Health Hazards:** Respiratory tract irritation, skin irritation, eye irritation, liver damage, central nervous system depression.

**Physical Hazards:** Flammable liquid and vapor. Vapor may cause flash fire.

### Potential Health Effects (Acute and Chronic)

**Inhalation:** Irritation of mucous membranes, headache, drowsiness, fatigue, nervousness, dullness, narcosis, lack of concentration, somnolence, symptoms of drunkenness. Reproductive effects have been reported in animals.

**Skin Contact:** Irritation, mild redness and burning, sensitization, allergic, contact dermatitis. Chronic exposure may result in defatting of the skin.

**Eye Contact:** Irritation, conjunctivitis, corneal cloudiness.

**Ingestion:** Headache, drowsiness, emotional lability, decreased inhibitions, exhilaration, boastfulness, talkativeness, remorse, belligerency, gradual visual impairment, muscular incoordination, slurring of speech, symptoms of drunkenness; long term may result in liver damage. Reproductive effects have been reported in animals.

### Listed as a Carcinogen/Potential Carcinogen

In the National Toxicology Program (NTP) Report on Carcinogens

In the International Agency for Research on Cancer (IARC) Monographs

By the Occupational Safety and Health Administration (OSHA)

Yes	No
<u>X<sup>(a)</sup></u>	<u>X</u>
<u>      </u>	<u>      </u>
<u>      </u>	<u>X</u>

<sup>(a)</sup> IARC lists ethanol (as related to alcoholic beverages) as Group 1 (*carcinogenic to humans*).

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### 3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

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Component	CAS Number	EC Number (EINECS)	Nominal Concentration (%)
Ethanol	64-17-5	200-578-6	≤25

<sup>(a)</sup> Concentrations of the components are listed as required by OSHA, 29 CFR 1910.1200 (g)(2)(i)(C)(1), for MSDS information with hazardous components (1 % or greater) and carcinogens (0.1 % or greater).

**EC Classification:** F (Ethanol)

**EC Risk (R No) Phrases:** 11

**EC Safety (S No) Phrases:** 7, 16

**EC Risk/Safety Phrases:** See Section 15, "Regulatory Information".

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### 4. FIRST AID MEASURES

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**Inhalation:** If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration by qualified personnel. Seek immediate medical attention.

**Skin Contact:** Rinse affected area with soap and water for at least 15 minutes. Seek medical assistance if necessary.

**Eye Contact:** Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

**Ingestion:** Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. If vomiting occurs, keep head lower than hips to prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

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### 5. FIRE FIGHTING MEASURES

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**Fire and Explosion Hazards:** Severe fire hazard. Vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive above flash point.

**Extinguishing Media:** Regular dry chemical, carbon dioxide, fine water spray, and alcohol resistant foam.

**Fire Fighting:** Avoid inhalation of combustion by-products.

**Flash Point (°C):** 29 (84 °F) for a 30 % ethanol/water solution.

**Method Used:** Closed cup.

**Autoignition Temperature (°C):** 363 (685.4 °F) for ethanol.

**Flammability Limits in Air (Ethanol)**

**UPPER (Volume %):** 19

**LOWER (Volume %):** 3.3

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### 6. ACCIDENTAL RELEASE MEASURES

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**Occupational Release:** Absorb with sand or other non-combustible material and collect in appropriate container for proper disposal.

**Disposal:** Refer to Section 13, "Disposal Considerations".

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### 7. HANDLING AND STORAGE

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**Storage:** Store and handling in accordance with all current regulations and standards.

**Safe Handling Precautions:** See Section 8, "Exposure Controls and Personal Protection".

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### 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

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**Exposure Limits for Ethanol**

**OSHA (PEL):** 1000 ppm TWA or 1900 mg/m<sup>3</sup> TWA

**ACGIH (TLV):** 1000 ppm STEL

**NIOSH (REL):** 1000 ppm TWA or 1900 mg/m<sup>3</sup> TWA  
3300 ppm IDLH

**Ventilation:** Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

**Respirator:** If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29 CFR 1910.134 must be followed. Refer to NIOSH 24 CFR 84 for applicable certified respirators.

**Eye Protection:** Wear safety goggles. An eyewash station and drench shower should be readily available near the handling and use areas.

**Personal Protection:** In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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### Ethanol:

<b>Appearance and Odor:</b>	Clear, colorless, liquid; fruity odor.
<b>Molecular Formula:</b>	C <sub>2</sub> H <sub>6</sub> O.
<b>Molar Mass:</b>	46.07 g/mol
<b>Specific Gravity (water = 1):</b>	0.7893
<b>Boiling Point:</b>	78.3 °C – 78.5 °C (172.9 °F – 173.3 °F)
<b>Vapor Pressure:</b>	40 mmHg, 19 °C
<b>Vapor Density (air = 1):</b>	1.59
<b>Melting Point:</b>	–117 °C (–179 °F)
<b>Water Solubility:</b>	Miscible.
<b>Solvent Solubility:</b>	Soluble in benzene, ether, acetone, chloroform, methanol, organic solvents.

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## 10. STABILITY AND REACTIVITY

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**Stability:** ☒ Stable ☐ Unstable

Stable at normal temperatures and pressure.

**Conditions to Avoid:** Avoid heat, flames, sparks, and other sources of ignition. Containers may rupture or explode if exposed to heat.

**Incompatible Materials:** Acids, bases, combustible materials, halo carbons, halogens, metal oxides, metal slats, metals, oxidizing materials, peroxides.

**Fire/Explosion Information:** See Section 5, “Fire Fighting Measures”.

**Hazardous Decomposition:** Oxides of carbon.

**Hazardous Polymerization:** ☐ Will Occur ☒ Will Not Occur

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## 11. TOXICOLOGICAL INFORMATION

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**Route of Entry:** ☒ Inhalation ☐ Skin ☒ Ingestion

### Toxicity Data for Ethanol:

Rat, Oral LD<sub>50</sub>: 7060 mg/kg

Rat, Inhalation LC<sub>50</sub>: 124.7 mg/L (4 h)

The following endpoints are a few of the endpoints listed by Registry of Toxic Effects of Chemical Substances (RTECS).

Mutagenic:	Human lymphocyte (DNA inhibition), TD: 220 mmol/L
Mutagenic:	Human liver (micronucleus test), TD: 15 mmol/L (24 h)
Mutagenic:	Human, Oral (micronucleus test), TD: 817.6 g/kg (6 year intermittent)
Reproductive:	Rat, Inhalation (1 d to 22 d pregnant), TCLo: 20 000 ppm (7 h)
Reproductive:	Rat, Oral (14 d to 16 d pregnant), TDLo: 24 g/kg
Tumorigenic:	Mouse, Oral, TDLo: 320 mg/kg (50 week intermittent)

Additional Information: May cross the placenta. May be excreted in breast milk. Allergic reactions to alcohols have been reported.

**Health Effects:** See Section 2, “Hazard Identification” for potential health effects.

**Target Organs:** Central nervous system and liver.

**Medical Conditions Aggravated by Exposure:** Central nervous system disorders, kidney disorders, liver disorders.

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## 12. ECOLOGICAL INFORMATION

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### Ecotoxicity Data for Ethanol

Fish: Fathead minnow (*Pimephales promelas*) LC<sub>50</sub> [static]: 12.0 mg/L – 16.0 mL/L (96 h)  
Rainbow trout (*Oncorhynchus mykiss*) LC<sub>50</sub> [static]: >100 mg/L (96 h)  
Invertebrate: Freshwater water flea (*Daphnia magna*) EC<sub>50</sub>: 10 800 mg/L (24 h)

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## 13. DISPOSAL CONSIDERATIONS

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**Waste Disposal:** Dispose of waste in accordance with all applicable federal, state, and local regulations.

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## 14. TRANSPORTATION INFORMATION

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**U.S. DOT and IATA:** Ethanol, UN1170; Hazard Class 3; Packing Group III.

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## 15. REGULATORY INFORMATION

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### U.S. Regulations

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.  
SARA Title III Section 302 (40 CFR 355.30): Not regulated.  
SARA Title III Section 304 (40 CFR 355.40): Not regulated.  
SARA Title III Section 313 (40 CFR 372.65): Not regulated.  
OSHA Process Safety (29 CFR 1910.119): Not regulated.  
SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH:	Yes
CHRONIC HEALTH:	Yes
FIRE:	Yes
REACTIVE:	No
PRESSURE:	No

### State Regulations:

California Proposition 65 Warnings:

This product contains a chemical (ethanol) known to the state of California to cause cancer.

This product contains a chemical (ethanol) known to the state of California to cause reproductive/developmental effects.

### Canadian Regulations:

WHMIS Information: Not provided for this material.

### European Regulations

#### EC Classification (Ethanol)

F: Highly flammable.

#### EC Risk Phrase(s):

R11 – Highly Flammable.

#### EC Safety Phrase(s):

S7 – Keep container tightly closed.

S16 – Keep away from sources of ignition - No smoking.

### National Inventory Status

**U.S. Inventory (TSCA):** Listed.

**TSCA 12(b), Export Notification:** Not Listed.

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## 16. OTHER INFORMATION

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**Sources:** ChemAdvisor, Inc., MSDS, *Ethyl Alcohol*, 20 December 2011.

EC; European Chemical Substance Information System (ESIS), *Ethyl Alcohol*, CAS No. 64-17-5, available at <http://esis.jrc.ec.europa.eu/index.php?PGM=cla> (accessed Mar 2012).

NIOSH Registry of Toxic Effects of Chemical Substances (RTECS), *Ethyl alcohol*, No. KQ6300000, CAS No. 64-17-5; May 2009; available at <http://www.cdc.gov/niosh-rtecs/KQ602160.html> (accessed Mar 2012).

**Disclaimer:** Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.