MATERIAL SAFETY DATA SHEET

SRM Supplier: **National Institute of Standards and Technology**
Standard Reference Materials Program
100 Bureau Drive, Stop 2321
Gaithersburg, Maryland 20899-2321

SRM Number: 1828a
MSDS Number: 1828a
SRM Name: Ethanol in Water Solutions
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MSDS Coordinator: Carmen S. Davis
Phone: (301) 975-6776
ChemTrec: 1-800-424-9300

FAX: (301) 926-4751
e-mail: SRMMSDS@nist.gov

SECTION I. MATERIAL IDENTIFICATION

Material Name: Ethanol in Water Solutions

Description: SRM 1828a consists of five ampoules: one ampoule contains approximately 20 mL of ethanol-water azeotrope (96 % mass fraction [1] ethanol, nominal); two ampoules each contain approximately 20 mL of the 2 % mass fraction ethanol-water solution, nominal; one ampoule contains approximately 5 mL of the 0.1 % mass fraction ethanol-water solution, nominal; and one ampoule contains approximately 5 mL of the 0.02 % mass fraction ethanol-water solution, nominal.

Other Designations: **Ethanol** (ethyl alcohol; alcohol anhydrous; anhydrol; ethyl hydrate; ethyl hydroxide; grain alcohol; methyl carbinol) in **Water**

Name	Chemical Formula	CAS Registry Number
Ethanol	CH_3CH_2OH	64-17-5

DOT Classification: Flammable Liquid, UN1170

Manufacturer/Supplier: Available from a number of suppliers

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Ethanol		ACGIH TLV-TWA: 1 000 mg/kg or 1900 mg/m^3
Concentration Level l	96.0	OSHA TLV-TWA: 1 000 mg/kg or 1900 mg/m^3
Concentration Level 2	2.0	Man, Oral: TD_{LO}: 22 500 mg/kg/4 weeks
Concentration Level 3	0.1	Infant, Oral: TD_{LO}: 11 712 µL/kg
Concentration Level 4	0.02	Woman, Oral: TD_{LO}: 1 200 mg/kg/3 h
		Man, Oral: TD_{LO}: 3 371 µL/kg
		Man, Oral: LD_{LO}: 1 400 mg/kg
		Rat, Oral: LD_{50}: 760 mg/kg

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Ethanol	
Appearance and Odor: a clear, colorless liquid with a characteristic alcoholic odor	**Vapor Pressure (@ 19 °C):** 40 mm Hg
Relative Molecular Mass: 46.07	**Evaporation Rate (carbon tetrachloride = 1):** 1.4
Density: 0.7893 g/mL	**Viscosity (@ 20 °C):** 1.22 cP to 1.41 cP
Boiling Point: 78 °C	**Freezing Point:** -117 °C
Water Solubility: soluble	**Solvent Solubility:** soluble in benzene, ether, acetone, chloroform, methanol, and organic solvents

NOTE: The physical property data are for pure ethanol.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Ethanol
Flash Point: 13 °C **Method Used:** Closed Cup **Autoignition Temperature:** 363 °C

Flammability Limits in Air (Volume %): **UPPER:** 19
LOWER: 3.3

Unusual Fire and Explosion Hazards: Ethanol is a severe fire and explosion hazard when exposed to heat or flame. Vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Vapor and air mixtures are explosive.

Extinguishing Media: Use alcohol-resistant foam, dry chemical, carbon dioxide, or water spray.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: **__X__ Stable** **_____ Unstable**

Conditions to Avoid: Avoid contact with heat, sparks, flames, or other sources of ignition. Avoid inhalation of vapors or combustion by-products. Avoid contact with the skin. Do not allow the material to contaminate water sources.

Incompatibility (Materials to Avoid): Ethanol is incompatible with halo carbons, combustible materials, metals, metal oxides, oxidizing materials, halogens, metal carbide, bases, and acids.

See Section IV**:** *Unusual Fire and Explosion Hazards*

Hazardous Decomposition or Byproducts: Thermal decomposition products of ethanol may include toxic oxides of carbon.

Hazardous Polymerization: **_____ Will Occur** **__X__ Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** **X** **Ingestion**

Ethanol: Inhalation of 1000 mg/kg to 10,000 mg/kg has caused temporary irritation of the upper respiratory tract and coughing. If exposure continues, central nervous system depression with headache, stupor, fatigue, dizziness, drowsiness, and loss of appetite may occur. Repeated or prolonged inhalation of vapors may cause irritation of the mucous membranes, headache, dizziness, nervousness, tremors fatigue, nausea, narcosis, lack of concentration, and somnolence. Direct contact with the skin may cause mild redness and burning. Sensitization has occasionally been reported to occur in some individuals resulting in allergic contact dermatitis in the form of eczematous eruptions. Repeated or prolonged contact with the skin can cause defatting of the tissue producing dry, fissured dermatitis. Eye contact with the vapor or liquid may cause temporary eye irritation with continuous tearing. Repeated contact may cause hyperemia of the conjunctiva.

Ingestion of ethanol may cause emotional lability and decreased inhibitions. Lack of coordination, slurring of speech, slowing of reaction time, sensory disturbances, and visual impairment may also occur. Other symptoms may include flushing of the face, dilated pupils, rapid pulse, nausea, vomiting, sweating, and diuresis. Chronic intoxication may result in weight loss, degenerative changes in the liver, kidneys, and brain. Gastroenteritis with anorexia and diarrhea, and cirrhosis of the liver. Human consumption of alcoholic beverages has been related to the occurrence of malignant tumors of the oral cavity, pharynx, larynx, esophagus, and liver. Reproductive effects have been reported in animals.

Medical Conditions Generally Aggravated by Exposure: central nervous system disorders, and kidney and liver disorders

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: If ingested, wash out mouth with water. Obtain medical assistance immediately.

TARGET ORGAN(S) OF ATTACK: central nervous system and liver

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of major spills and/or leaks. Evacuate nonessential personnel. Stop the leak if one can do so without risk. Absorb small spills with sand or other absorbent material and place into containers for disposal.

Waste Disposal: Follow all federal, state, and local laws governing disposal.

Handling and Storage: Persons handling this material must wear protective eyewear, clothing, and gloves to prevent contact with this material.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

This material should be stored in a cool, dry, well-ventilated area away from incompatible materials and conditions. Protect containers from physical damage.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Ethyl Alcohol*, 01 December 2000.
Merck Index, 11th Ed., 1989.
The Sigma Aldrich Library of Chemical Safety Data, Ed. II, 1988.

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 on the MSDS. The certified value for this material is given in the NIST Certificate of Analysis.