Safety Data Sheet

National Institute of Advanced Industrial Science and Technology
AIST

1. Identification of the Substance/Mixture and the Supplier

Supplier	:	National Institute of Advanced Industrial Science and Technology (AIST)
Address	:	1-3-1, Kasumigaseki, Chiyoda, Tokyo, Japan
Office in Charge	:	Reference Materials Office, Center for Quality Management of Metrology, National Metrology Institute of Japan
Person in Charge	:	Certified Reference Material Staff
Telephone No.	:	+81-29-861-4059 Fax No. : +81-29-861-4009
Emergency Contact	:	Same as above
		Prepared on : March 26, 2012
		Revised on : March 31, 2017
		ID Number : 8301001
Identity of Substance/Mixture	:	Certified reference material: NMIJ CRM 8301-a Bioethanol
Recommended Use of the Chemical and Restriction on Use	:	This reference material can be used, in quantification of the following ingredients of bioethanol fuel and similar samples, for calibration of analysis equipment as well as quality control of analysis and validation of analytical methods and analysis equipment. Do not use this reference material for other purposes than testing/research.

2. Hazards Identification

GHS Classification :	Flammable liquid	:	Hazard Category 2
	Serious eye damage/ Eye irritation	:	Hazard Category 2A
	Germ cell mutagenicity	:	Hazard Category 1B
	Reproductive toxicity	:	Hazard Category A
	Specific target organ toxicity/Systemic toxicity (Single exposure)	:	Hazard Category 3 (Respiratory tract irritation) Hazard Category 3 (Narcotic effects)
	Specific target organ toxicity/Systemic toxicity (Repeated exposure)	:	Hazard Category 1 (Liver) Hazard Category 2 (Nerve)

GHS Label Element :

Signal Word : Danger

Hazards Statement:
Highly flammable liquid and vapor
Intense eye irritation
May lead to genetic disorder
May have adverse effects on fertility or embryo/fetus
May lead to irritation of respiratory system
May lead to drowsiness or dizziness

Damage to organ by prolonged or repeated exposure (Liver)
May cause damage to organ by prolonged or repeated exposure (Nerve)

Precautionary Statement : ［Precaution］
Do not use or handle this reference material before reading and understanding all safety precautions.
Do not drink, eat or smoke while handling this reference material.
Avoid mist/vapor/spray inhalation.
Use personal protection equipment, protective gloves and eye protector/face protector as necessary.
Use this reference material only in outdoor or well-ventilated environment.
Use tools which do not cause fire.
Keep this reference material away from heat/sparks/open flame/ high-temperature items. No smoking.
Take an appropriate precaution against ESD (electrostatic discharge).
Use explosion-proof electric equipment/ventilation equipment/ lighting equipment.
Ground containers, reservoirs and receivers. Seal them air-tightly.
Wash hands thoroughly after handling this reference material.
［First-aid action］
Eye contact: Irrigate eyes carefully with water for a few minutes. Then take out contact lenses if it is possible to easily do so. Keep irrigating eyes after taking out contact lenses.
When eye irritation is prolonged: Seek medical examination/ treatment.
When feeling sick: Seek medical examination/ treatment.
Inhalation: Move the person to fresh air and keep him/her at rest in an easy-to-breathe position.
Skin (or hair) contact: Take off/remove all contaminated clothing immediately. Flush exposed skin area with running water/shower.
When being exposed or when there are concerns about exposure: Seek medical examination/treatment.
［Storage］
Store this reference material in air-tight containers in a light-shielded clean environment at about 15 °C to 30 °C. Store this reference material in a locked storage.
［Disposal］
Entrust disposal of this reference material and its container to a professional waste disposal company licensed by prefectural governor.

The other hazards than the above do not result in classification or are not covered by the GHS.

3. Composition/Information on Ingredients

Substance/Mixture : Mixture

Ingredient 1
Chemical name : Ethanol
Synonym : Ethyl alcohol
Chemical formula : C_2H_5OH
Molecular weight : 46.07

CAS number	:	64-17-5
Content	:	>99 %
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : 2-202 Industrial Safety and Health Act : Published

Ingredient 2

Chemical name	:	Water
Synonym	:	-
Chemical formula	:	H_2O
Molecular weight	:	18.02
CAS number	:	7732-18-5
Content	:	About 1700 mg/kg
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : - Industrial Safety and Health Act : -

Ingredient 3

Chemical name	:	Methanol
Synonym	:	Methyl alcohol
Chemical formula	:	CH_3OH
Molecular weight	:	32.04
CAS number	:	67-56-1
Content	:	About 480 mg/kg
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : 2-201 Industrial Safety and Health Act : Published

Ingredient 4

Chemical name	:	Acetic acid
Synonym	:	Ethanoic acid, Glacial aceitc acid
Chemical formula	:	CH_3COOH
Molecular weight	:	60.05
CAS number	:	64-19-7
Content	:	About 50 mg/kg
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : 2-688 Industrial Safety and Health Act : Published

Ingredient 5

Chemical name	:	Dimethyl sulfide
Synonym	:	Methyl sulfide, Dimethyl sufilde
Chemical formula	:	$(CH_3)_2S$
Molecular weight	:	62.14
CAS number	:	75-18-3
Content	:	About 4 mg/kg

Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : 2-466 Industrial Safety and Health Act : Published

Ingredient 6

Chemical name	:	Copper (Ⅱ) acetate
Synonym	:	Copper (Ⅱ) acetate anhydride
Chemical formula	:	$Cu(CH_3COO)_2$
Molecular weight	:	181.63
CAS number	:	142-71-2
Content	:	About 0.15 mg/kg
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : 2-693 Industrial Safety and Health Act : Published
Hazardous Ingredient	:	Ethanol, Acetic acid, Methanol, Dimethyl sulfide, Copper (Ⅱ) acetate

4. First-aid Measures

Eye Contact	:	Irrigate eyes with a large amount of water for more than 15 minutes. Then take out contact lenses if it is possible to do so easily. Keep irrigating eyes after taking out contact lenses. Seek medical attention if eye irritation is prolonged.
Skin Contact	:	Flush exposed area with a large amount of water. Seek medical attention when inflammation is developed.
Inhalation	:	Move the person to fresh air and keep him/her at rest and warm. Seek medical attention immediately.
Ingestion	:	Have the person swallow a large amount of water or salt water and get him/her vomit. Seek medical attention immediately.
Measures to be taken to protect the person applying first aid	:	Use personal protective equipment.

5. Fire-fighting Measures

Extinguishing Media	:	Powder, carbon dioxide (CO_2), foam (alcohol foam), a large amount of water
Fire-Specific Hazards	:	Risk of ignition-triggered explosion
Specific Fire-Fighting Method	:	Eliminate combustion sources at the origin of a fire and put out fire by using extinguishing media. Move movable containers promptly to a safe place. In the case of immovable containers, cool their surroundings with sprayed water.
Protection of Fire-Fighters	:	Carry out fire-fighting from the windward in order to avoid inhalation of hazardous gas. Use personal protective equipment such as fireproof clothing, heatproof clothing, protective clothing, air respirator oxygen mask, compressed oxygen closed-circuit self-contained breathing apparatus, rubber gloves and rubber boots.

6. Accidental Release Measures

Personal Precaution	:	Immediately remove potential ignition sources from surrounding areas. Make fire-extinguishing tools available to prepare for fire ignition.
Personal Protective Equipment and Emergency Procedures	:	Ventilate the affected area thoroughly until the clean-up operation is completed when accidental release takes place in an indoor environment. Mark the restricted area with rope etc. to keep out unauthorized people. Use appropriate personal protective equipment during the operation to avoid skin contact of splash etc. and inhalation of dust and gas. Carry out the clean-up operation from the windward and make people on the leeward side evacuate. Take precautions as surface of the affected area is slippery.
Environmental Precautions	:	Take precautions to prevent the spilled bioethanol from draining into rivers to adversely impact the environment. Make it sure to appropriately treat contaminated wastewater in order to prevent untreated wastewater from being released into the surrounding environment.
Recovery and Neutralization	:	Strict ban on fire. Collect spilled bioethanol in empty containers by getting it adsorbed to wiping cloth, rag or earth and sand, etc. Rinse away the remains with a large amount of water. Make it sure to use personal protective equipment during the operation. Do not carry out the clean-up operation at the leeward side.
Secondary Disaster Prevention Measures	:	Immediately remove potential ignition sources from surrounding areas. Make fire-extinguishing media/tools available. Use safe tools which do not produce any sparks.

7. Handling and Storage Precautions

Handling

Engineering Precautions	:	Strictly ban on fire. Avoid contact with high-temperature items, sparks and strong oxidizing agents.
Precautions	:	Close containers air-tightly after using this reference material. Prevent leakage, overflow and scattering and avoid generation of vapor. Avoid rough handling such as turning over, dropping, giving a shock to or dragging a container. Wash hands, face, etc. thoroughly and gargle after handling this reference material. Restrict drinking, eating and smoking to a designated area. Do not bring gloves and other contaminated personal protective equipment into staff room Make an area where this reference material is handled a restricted area to keep out unauthorized people.
Precautions for Safe Handling	:	Use appropriate personal protective equipment so as to avoid inhalation and contact with eyes, skin and clothing. Use local ventilation equipment when this reference material is handled in indoor shop floor. Take ESD precautions. Use conductive work clothing and shoes.

Storage

Appropriate Storage Conditions	:	Use explosion-proof electric equipment and ground all instruments in storage area. Store this reference material in air-tight containers in a light-shielded clean environment at about 15 °C to 30 °C. Store this reference material in a locked storage.
Engineering	:	Store this reference material in air-tight containers in a

Precautions		well-ventilated environment. Strict ban on fire. Store this reference material in a light-shielded environment.
Incompatible Substances	:	Oxidants such as Calcium hypochlorite, Silver oxide, Ammonia, Nitric acid, Silver nitrate, Mercuric nitrate and Magnesium perchlorate
Safe Container Packaging Material	:	Glass

8. Exposure Controls/Personal Protection

Threshold Limit Value/Concentration Limit

Not specified

Permissible Concentration (Ingredient) Ethanol

・ACGIH TLV-TWA	:	1000 ppm
・Value recommended by Japan Society for Occupational Health	:	Not specified
・OSHA PEL TWA	:	air TWA 1000 ppm

Permissible Concentration (Ingredient) Water

・ACGIH TLV-TWA	:	Not specified
・Value recommended by Japan Society for Occupational Health	:	Not specified
・OSHA PEL TWA	:	Not specified

Permissible Concentration (Ingredient) Acetic acid

・ACGIH TLV-TWA	:	TWA 10 ppm, 25 mg/m^3; STEL 15 ppm, 37 mg/m^3
・Value recommended by Japan Society for Occupational Health	:	10 ppm, 25 mg/m^3
・OSHA PEL TWA	:	8 H 10 ppm, 25 mg/m^3; STEL 15 ppm,37 mg/m^3

Permissible Concentration (Ingredient) Methanol

・ACGIH TLV-TWA	:	200 ppm(260 mg/m^3)(skin); STEL 250 ppm (skin)
・Value recommended by Japan Society for Occupational Health	:	200 ppm(260 mg/m^3)
・OSHA PEL TWA	:	air TWA 200 ppm(260 mg/m^3)

Permissible Concentration (Ingredient) Dimethyl sulfide

・ACGIH TLV-TWA	:	10 ppm
・Value recommended by Japan Society for Occupational Health	:	Not specified
・OSHA PEL TWA	:	Not specified

Permissible Concentration (Ingredient) Copper (II) acetate

・ACGIH TLV-TWA	:	1 mg(Cu)/m^3
・Value recommended by Japan Society for Occupational Health	:	Not specified
・OSHA PEL TWA	:	Not specified

Engineering Controls

Ventilation/Exhaust	:	Local ventilation system or general ventilation system
Safety control/ Gas detection	:	Measuring equipment, Detecting tube
Storage Precautions	:	Use explosion-proof equipment and take ESD precautions in facilities.

Personal Protective Equipment (PPE)

Respiratory System	:	Gas mask for organic gases, Air respirator oxygen mask
Hands	:	Protective gloves
Eyes	:	Eye protector
Skin and Body	:	Protective clothing, Face protector

9. Physical and Chemical Properties

・Appearance, etc.	:	Liquid
・Color	:	Clear and colorless
・Odor	:	Characteristic odor
・pH	:	No data
・Melting point	:	No data
・Boiling point	:	No data
・Flashing point	:	No data
・Explosive range	:	No data
・Vapor pressure	:	No data
・Relative vapor density(Air=1)	:	No data
・Specific gravity or bulk specific gravity	:	0.7900 g/mL (20 °C)　0.7857 g/mL (25 °C)
・Solubility	:	No data
・*n*-Octanol/water partition coefficient (Log Po/w)	:	No data
・Auto-ignition temperature	:	No data

10. Stability and Reactivity

◇Stability

Properties changed by light

◇Reactivity

Generate risks of fire and explosion as this reference material gradually reacts with calcium hypochlorite, silver oxide and ammonia.
Generate risks of fire and explosion as this reference material violently reacts with nitric acid, silver nitrate, mercuric nitrate and magnesium perchlorate.

◇Conditions to Avoid

Sunlight, heat, open flame, high temperature, sparks, static electricity and other ignition sources

◇Hazardous Decomposition Products

Carbon monoxide (CO) and carbon dioxide (CO_2)

11. Toxicological Information

Acute Toxicity　【Ethanol】
Oral　Human　Infant　TDLo: 11712 µL/kg (RTECS)
Oral　Human　Male　TDLo: 0.8 g/kg (RTECS)
Oral　Rat　LD50: 7060 mg/kg (RTECS)
Inhalation　Rat　LC50: 20000 ppm/10 hours (RTECS)
Oral　Mouse　LC50: 3450 mg/kg (RTECS)
Dermal　Rabbit　LDLo: 20 g/kg (RTECS)

Skin Corrosion/　【Ethanol】

Irritation	Skin irritation　Rabbit　20 mg/24 hours　Moderate (RTECS)
Serious Eye Damage/ Eye Irritation	【Ethanol】 Eye irritation　Rabbit　500 mg; Serious (RTECS) Eye irritation　Rabbit　500 mg/24 hours　Light (RTECS) Based on two evidences: 1) DFGOT (1996) classifies this reference material as 'moderate' based on the results of the eye irritation test performed in accordance with OECD TG405 and Draize Test and 2) ACGIH (2001) describes that human corneal epithelial damage and conjunctival hyperemia get recovered in one or two days.
Germ Cell Mutagenicity	【Ethanol】 Based on "Report on dominant lethality of rats and mice" (DFG (1999) and "Report on aneuploidy induction of mouse germ cells" (IARC (1988))
Reproductive Toxicity	【Ethanol】 A number of cases are reported that regular intake of a large amount of alcohol has negative impacts including on deformity on human embryo/fetus (DFGOT (1996)).
Specific Target Organ Toxicity/Systemic Toxicity (Single Exposure)	【Ethanol】 Based on three evidences: 1) "Oral intake of ethanol by human has impacts on central nervous system, generates headache and fatigue and impairs concentration" (ICSC (2000)), 2) "Oral intake of ethanol by human, when it leads to acute poisoning, may result in death" (DFGOT (1996)) and 3) "Inhalation of 5000 ppm (9.4 mg/L) ethanol by human leads to respiratory tract irritation, stupor and pathological sleep" (ACGIH (2001)).
Specific Target Organ Toxicity/Systemic Toxicity (Repeated Exposure)	【Ethanol】 Based on two evidences: 1) "Prolonged intake of a large amount of alcohol by human causes damages on most organs.　Target organ which is damaged most seriously is liver.　Damage starts from fatty degeneration, develops into necrosis and fibrosing, and ends up with cirrhosis" (DFGOT (1996)) and 2) "withdrawal symptoms of alcoholic patients (tremor, epilepsy and confusion)"」(HSDB (2003))

12. Ecological Information

Persistence and Degradability

【Ethanol】

Good degradaibility (tests based on Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.)

Bioaccumulative Potential

【Ethanol】

No data available

Ecotoxicity

【Ethanol】

Fish toxicity:　Fish (Fathead minnow)　96 hours　LC50 > 100 mg/L（SIDS (2005)）
Crustacean (Ceriodaphnia)　48 hours　LC50 = 5012 mg/L（SIDS (2005)）
Alga (Chlorella)　96 hours　EC50 = 1000 mg/L（SIDS (2005)）

Other data: log Po/w：–0.32

13. Disposal Considerations

Residual Waste	:	Incineration method ・Spray residual waste into fire chamber of incinerator and incinerate it. ・When residual waste is small in volume, get it absorbed to sawdust, rag, etc. and incinerate it in an open-type incinerator. Discharge wastewater containing residual waste after treating it with activated sludge, etc. Dispose this reference material in accordance with applicable legislation and local government ordinance. When the above-mentioned treatments are not possible, entrust disposal of residual waste to a professional waste disposal company licensed by prefectural governor.
Contaminated Container and Package	:	Dispose containers after thoroughly removing their contents.

14. Transport Information

National Regulation (Road or Rail)	:	Road Act: Article 19-13 of Enforcement Order "Vehicle traffic restriction"
UN Number	:	1170
UN Classification	:	Class 3 (Flammable liquids)
Shipping Name	:	Ethanol or its solution (excluding aqueous solution whose alcohol content is 24 vol % or less)
Packing Group	:	PG Ⅱ
ICAO/IATA	:	
Marine Pollutant	:	Not applicable
Precautions	:	When transporting this reference material, make it sure that its containers are not leaky, load it in a way to prevent turning over, dropping and being damaged, and take appropriate measures to avoid collapse. "Strict ban on fire" as this reference material is flammable liquid. Keep this reference material away from direct sunlight.

15. Regulatory Information

◇Fire Defense Law

Dangerous Material Class 4　Alcohols (water soluble)　Danger Rating 2

◇Industrial Safety and Health Law

- Article 57-2 (Enforcement Order: Article 18)　Hazardous substance whose name, etc. must be labeled.
- Article 57-2 (Enforcement Order: Article 18-2)　Hazardous substance whose name, etc. must be notified: No.61

Enforcement Order Appendix 1-4 Dangerous material　Flammable

◇Ship Safety Law (Dangerous Material Rule)

Flammable liquid

◇Civil Aeronautics Act

Flammable liquid

◇Act for the Prevention of Marine Pollution and Maritime Disasters

Enforcement Order Appendix 1　Hazardous Liquid Substance　Class Z substance

◇Air Pollution Control Act

Volatile organic compound (VOC) (Article 2-4)

16. Other Information

Others

The information in this document is not intended to be exhaustive and is based on currently available information and data. The measures given in this document are applicable only to normal handling conditions. When handling this reference material under special conditions etc., it is recommended to take safety measures appropriate to each specific application and context of use. This document is intended to provide information and not intended to guarantee anything in handling this reference material.