SAFETY DATA SHEET

according to the (US) Hazard Communication Standard (29 CFR 1910.1200)

Revision Date 07/08/2014 Version 1.2

SECTION 1. Identification

Product identifier

Product number	109630
Product name	2-Butanol for analysis EMSURE®
CAS-No.	78-92-2

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

Identified uses	Reagent for analysis, Chemical production, Solvent

Details of the supplier of the safety data sheet

Company	EMD Millipore Corporation | 290 Concord Road, Billerica, MA 01821, United States of America | General Inquiries: +1-978-715-4321 | Monday to Friday, 9:00 AM to 4:00 PM Eastern Time (GMT-5)

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

SECTION 2. Hazards identification

GHS Classification

Flammable liquid, Category 3, H226
Eye irritation, Category 2, H319
Specific target organ systemic toxicity - single exposure, Category 3, H335
Specific target organ systemic toxicity - single exposure, Category 3, H336

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

GHS-Labeling

Hazard pictograms

Signal Word
Warning

Hazard Statements
H226 Flammable liquid and vapor.
H319 Causes serious eye irritation.

H335 + H336 May cause respiratory irritation, and drowsiness or dizziness.

Precautionary Statements
P210 Keep away from heat.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

OSHA Hazards
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). This information is based on 29 CFR 1910.1200 criteria prior to adoption of the GHS and may deviate from the GHS information.

Other hazards
None known.

SECTION 3. Composition/information on ingredients

Formula	$CH_3CH(OH)CH_2CH_3$	$C_4H_{10}O$ (Hill)
Molar mass	74.12 g/mol	

Hazardous ingredients
Chemical Name (Concentration)
CAS-No.
butan-2-ol (>= 90 % - <= 100 %)
78-92-2
Exact percentages are being withheld as a trade secret.

SECTION 4. First aid measures

Description of first-aid measures
Inhalation
After inhalation: fresh air. Consult doctor if feeling unwell.

Skin contact
After skin contact: wash off with plenty of water. Remove contaminated clothing.

Eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist.

Ingestion
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately. Subsequently administer: activated charcoal (20 - 40 g in 10% slurry). Laxative: Sodium sulfate (1 tablespoon/1/4 l water).

Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed
irritant effects, Cough, Shortness of breath, narcosis, drowziness, CNS disorders, Dizziness

Indication of any immediate medical attention and special treatment needed
Gastric lavage.

SECTION 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media

Carbon dioxide (CO2), Foam, Dry powder

Unsuitable extinguishing media

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

Special hazards arising from the substance or mixture

Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapors possible in the event of fire.

Advice for firefighters

Special protective equipment for fire-fighters

In the event of fire, wear self-contained breathing apparatus.

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

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.

Advice for emergency responders: Protective equipment see section 8.

Environmental precautions

Do not empty into drains. Risk of explosion.

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.

SECTION 7. Handling and storage

Precautions for safe handling

Observe label precautions.

Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers

Do not use light-weight-metal containers.

Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage temperature: no restrictions.

SECTION 8. Exposure controls/personal protection

Exposure limit(s)

Ingredients

Basis	Value	Threshold limits	Remarks
butan-2-ol 78-92-2			
ACGIH	Time Weighted Average (TWA):	100 ppm	
NIOSH/GUIDE	Recommended exposure limit (REL):	100 ppm 305 mg/m³	
	Short Term Exposure Limit (STEL):	150 ppm 455 mg/m³	
OSHA_TRANS	PEL:	150 ppm 450 mg/m³	
Z1A	Time Weighted Average (TWA):	100 ppm 305 mg/m³	

Engineering measures

Technical measures and appropriate working operations should be given priority over the use of personal protective equipment.

Individual protection measures

Protective clothing should be selected specifically for the workplace, depending on concentration and quantity of the hazardous substances handled. The chemical resistance of the protective equipment should be inquired at the respective supplier.

Hygiene measures

Change contaminated clothing. Application of skin- protective barrier cream recommended.
Wash hands after working with substance.

Eye/face protection

Safety glasses

Hand protection

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Other protective equipment:

Flame retardant antistatic protective clothing

Respiratory protection

required when vapors/aerosols are generated.

Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

SECTION 9. Physical and chemical properties

Physical state	liquid
Color	colorless
Odor	alcohol-like
Odor Threshold	No information available.
pH	at 68 °F (20 °C) neutral
Melting point	-115 °C
Boiling point/boiling range	210 - 216 °F (99 - 102 °C) at 1,013 hPa
Flash point	75 °F (24 °C) Method: c.c.
Evaporation rate	No information available.
Flammability (solid, gas)	No information available.
Lower explosion limit	1.4 %(V)
Upper explosion limit	9.8 %(V)
Vapor pressure	16.5 hPa at 68 °F (20 °C)
Relative vapor density	2.6
Density	0.81 g/cm³ at 68 °F (20 °C)
Relative density	No information available.
Water solubility	125 g/l at 68 °F (20 °C)
Partition coefficient: n-octanol/water	log Pow: 0.61 (experimental) (Lit.) Bioaccumulation is not expected.
Autoignition temperature	No information available.
Decomposition temperature	No information available.

Viscosity, dynamic	4.21 mPa.s at 68 °F (20 °C)
Explosive properties	Not classified as explosive.
Oxidizing properties	none
Ignition temperature	734 °F (390 °C) Method: DIN 51794

SECTION 10. Stability and reactivity

Reactivity
Vapor/air-mixtures are explosive at intense warming.

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

Possibility of hazardous reactions
Exothermic reaction with:

Alkali metals, Alkaline earth metals, Strong oxidizing agents, strong reducing agents, Aluminum, acid halides, chromium(VI) oxide

Conditions to avoid
Heating.

Incompatible materials
Aluminum, rubber, various plastics

Hazardous decomposition products
no information available

SECTION 11. Toxicological information

Information on toxicological effects

Likely route of exposure
Inhalation, Eye contact, Skin contact

Target Organs
Eyes
Skin
Respiratory system
Central nervous system

Acute oral toxicity
LD50 rat: 6,480 mg/kg
OECD Test Guideline 401

Symptoms: Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.

Acute inhalation toxicity
LC50 rat: 48.5 mg/l; 4 h (RTECS)

Irritating to respiratory system.
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract

Acute dermal toxicity
LD50 rat: > 2,000 mg/kg
(RTECS)

Skin irritation
rabbit
Result: No skin irritation
(IUCLID)

Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

Eye irritation
rabbit
Result: Eye irritation
(IUCLID)

Causes serious eye irritation.

Genotoxicity in vitro
Ames test
Result: negative
Method: OECD Test Guideline 471

Specific target organ systemic toxicity - single exposure
May cause respiratory irritation.
May cause drowsiness or dizziness.

Specific target organ systemic toxicity - repeated exposure
The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Aspiration hazard
Regarding the available data the classification criteria are not fulfilled.

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.
OSHA	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
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.
ACGIH	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential

carcinogen by ACGIH.

Further information

After absorption of large quantities:
Systemic effects:
CNS disorders, narcosis
Handle in accordance with good industrial hygiene and safety practice.

SECTION 12. Ecological information

Ecotoxicity

Toxicity to fish

LC50 Pimephales promelas (fathead minnow): 3,670 mg/l; 96 h (ECOTOX Database)

Toxicity to daphnia and other aquatic invertebrates

EC50 Daphnia magna (Water flea): 4,227 mg/l; 48 h (ECOTOX Database)

Persistence and degradability

Biodegradability

98 %; 5 d
(External MSDS)
Readily biodegradable.

Biochemical Oxygen Demand (BOD)

1,870 mg/g (5 d)
(IUCLID)

Chemical Oxygen Demand (COD)

2,470 mg/g
(IUCLID)

Bioaccumulative potential

Partition coefficient: n-octanol/water

log Pow: 0.61
(experimental)
(Lit.) Bioaccumulation is not expected.

Mobility in soil

No information available.

Additional ecological information

No interference with wastewater treatment plants are to be expected when used properly.
Discharge into the environment must be avoided.

SECTION 13. Disposal considerations

The information presented only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. Disposal should be in accordance with applicable regional, national and local laws and regulations.

SECTION 14. Transport information

Land transport (DOT)

UN number	UN 1120
Proper shipping name	BUTANOLS
Class	3
Packing group	III
Environmentally hazardous	--

Air transport (IATA)

UN number	UN 1120
Proper shipping name	BUTANOLS
Class	3
Packing group	III
Environmentally hazardous	--
Special precautions for user	no

Sea transport (IMDG)

UN number	UN 1120
Proper shipping name	BUTANOLS
Class	3
Packing group	III
Environmentally hazardous	--
Special precautions for user	yes
EmS	F-E S-D

SECTION 15. Regulatory information

United States of America

OSHA Hazards

Flammable Liquid
Eye irritant
Respiratory irritant
Target organ effects

This information is based on 29 CFR 1910.1200 criteria prior to adoption of the GHS, and may deviate from the GHS information on the label and in section 2.

SARA 311/312 Hazards

Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313

The following components are subject to reporting levels established by SARA Title III, Section 313:

Ingredients

butan-2-ol	78-92-2	*100 %*

SARA 302
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

Clean Water Act
This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.

This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.

DEA List I
Not listed

DEA List II
Not listed

US State Regulations

Massachusetts Right To Know
Ingredients
butan-2-ol

Pennsylvania Right To Know
Ingredients
butan-2-ol

New Jersey Right To Know
Ingredients
butan-2-ol

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

Notification status
TSCA:	All components of the product are listed in the TSCA-inventory.
DSL:	All components of this product are on the Canadian DSL.

SECTION 16. Other information

Training advice
Provide adequate information, instruction and training for operators.

Full text of H-Statements referred to under sections 2 and 3.
H226	Flammable liquid and vapor.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.

Key or legend to abbreviations and acronyms used in the safety data sheet
Used abbreviations and acronyms can be looked up at www.wikipedia.org.

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