SECTION 1. Identification

Product identifier

- Product number: 801548
- Product name: 2-Bromobutane for synthesis

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

- Identified uses: Chemical for synthesis

Details of the supplier of the safety data sheet

- Company: EMD Millipore Corporation | 290 Concord Road, Billerica, MA 01821, United States of America
  | SDS Phone Support: +1-978-715-1335
  | 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 2, H225
- Chronic aquatic toxicity, Category 3, H412

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

GHS-Labeling

Hazard pictograms

Signal Word

Danger

Hazard Statements

- H225 Highly flammable liquid and vapor.
- H412 Harmful to aquatic life with long lasting effects.

Precautionary Statements

- P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P273 Avoid release to the environment.
P403 + P235 Store in a well-ventilated place. Keep cool.

**OSHA Hazards**
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Other hazards**
None known.

### SECTION 3. Composition/information on ingredients

**Formula**
CH₃CH₂CHBrCH₃  C₄H₉Br (Hill)

**CAS-No.**
78-76-2

**Molar mass**
137.01 g/mol

**Hazardous ingredients**

*Chemical Name (Concentration)*

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-bromobutane (&gt;= 90 % - &lt;= 100 % )</td>
<td>78-76-2</td>
</tr>
</tbody>
</table>

### SECTION 4. First aid measures

**Description of first-aid measures**

**Inhalation**
After inhalation: fresh air.

**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.

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

Never give anything by mouth to an unconscious person.

**Most important symptoms and effects, both acute and delayed**
Unconsciousness, narcosis, inebriation, Nausea, Headache
The following applies to aliphatic halogenated hydrocarbons in general: systemic effect: narcosis, cardiovascular isorders. Toxic effect on liver, kidneys.

**Indication of any immediate medical attention and special treatment needed**
No information available.

### SECTION 5. Fire-fighting measures

**Extinguishing media**

*Suitable extinguishing media*
Water, 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.
Fire may cause evolution of:
hydrogen bromide

Advice for firefighters
Special protective equipment for fire-fighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system. Suppress (knock down) gases/vapors/mists with a water spray jet. Remove container from danger zone and cool with water.

SECTION 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid substance contact. Do not breathe vapors, aerosols.
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
Keep away from heat and sources of ignition. Keep container tightly closed in a dry and well-ventilated place.
Store at +2°C to +8°C (+36°F to +46°F).
SECTION 8. Exposure controls/personal protection

Exposure limit(s)
Contains no substances with occupational exposure limit values.

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>liquid</td>
</tr>
<tr>
<td>Color</td>
<td>colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>characteristic</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No information available.</td>
</tr>
<tr>
<td>pH</td>
<td>No information available.</td>
</tr>
<tr>
<td>Melting point</td>
<td>-112 °C</td>
</tr>
<tr>
<td>Boiling point/boiling range</td>
<td>194 - 198 °F (90 - 92 °C) at 1,013 hPa</td>
</tr>
<tr>
<td>Flash point</td>
<td>70 °F (21 °C)</td>
</tr>
<tr>
<td></td>
<td>Method: c.c.</td>
</tr>
</tbody>
</table>
Evaporation rate: No information available.

Flammability (solid, gas): No information available.

Lower explosion limit: 2.6 % (V)

Upper explosion limit: 6.6 % (V)

Vapor pressure: 70 hPa at 68 °F (20 °C)

Relative vapor density: No information available.

Relative density: 1.26 g/cm³ at 68 °F (20 °C)

Water solubility: < 1 g/l at 68 °F (20 °C)

Partition coefficient: n-octanol/water: log Pow: 2.58 (calculated)

(Lit.) Bioaccumulation is not expected (log Pow <1).

Autoignition temperature: No information available.

Decomposition temperature: No information available.

Viscosity, dynamic: No information available.

Explosive properties: Not classified as explosive.

Ignition temperature: 509 °F (265 °C)

SECTION 10. Stability and reactivity

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

Chemical stability
- Sensitive to moisture

Possibility of hazardous reactions
- Violent reactions possible with:
  - Exothermic reaction with:
  - Oxidizing agents, Strong bases
- Risk of explosion with:
  - Sodium

Conditions to avoid
- Heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.

Incompatible materials
various plastics

Hazardous decomposition products
in the event of fire: See section 5.

SECTION 11. Toxicological information
Information on toxicological effects
Likely route of exposure
Inhalation, Eye contact, Skin contact
Acute inhalation toxicity
Symptoms: Nausea
Eye irritation
rabbit
Result: No eye irritation
(External MSDS)
Sensitization
Sensitization test: guinea pig
Result: negative
(External MSDS)
Genotoxicity in vitro
Ames test
Result: positive
(External MSDS)
Specific target organ systemic toxicity - single exposure
The substance or mixture is not classified as specific target organ toxicant, single exposure.
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**

In high concentrations:
- Inebriation, unconsciousness, narcosis, headache
- The following applies to aliphatic halogenated hydrocarbons in general: systemic effect: narcosis, cardiovascular isorders. Toxic effect on liver, kidneys.
- Other dangerous properties can not be excluded.
- Handle in accordance with good industrial hygiene and safety practice.

**SECTION 12. Ecological information**

**Ecotoxicity**

*Toxicity to daphnia and other aquatic invertebrates*

EC50 Daphnia: 16 mg/l; 48 h (External MSDS)

**Persistence and degradability**

*Biodegradability*

- 4%; 21 d
- OECD Test Guideline 301D
- Not readily biodegradable.

**Bioaccumulative potential**

*Partition coefficient: n-octanol/water*

- log Pow: 2.58
- (calculated)
- (Lit.) Bioaccumulation is not expected (log Pow <1).

**Mobility in soil**

*Distribution among environmental compartments*

- log Koc: 2.03
- (External MSDS) Mobility of the substance in soil is expected (log koc <3).

**Other adverse effects**

*Henry constant*

- 1600 Pa*m³/mol
- Method: (calculated)
- (Lit.) Distribution preferentially in air.

**Additional ecological information**

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 2339
Proper shipping name   2-BROMOBUTANE
Class                  3
Packing group          II
Environmentally hazardous --

Air transport (IATA)

UN number              UN 2339
Proper shipping name   2-BROMOBUTANE
Class                  3
Packing group          II
Environmentally hazardous --
Special precautions for user no

Sea transport (IMDG)

UN number              UN 2339
Proper shipping name   2-BROMOBUTANE
Class                  3
Packing group          II
Environmentally hazardous --
Special precautions for user yes
EmS                     F-E S-D

SECTION 15. Regulatory information

United States of America

OSHA Hazards
Flammable Liquid

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

SARA 313
SARA 313: 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 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
Remarks
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know
Ingredients
2-bromobutane

New Jersey Right To Know
Ingredients
2-bromobutane

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.
H225 Highly flammable liquid and vapor.
H412 Harmful to aquatic life with long lasting effects.

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.
The information contained herein is based on the present state of our knowledge. It characterizes the product with regard to appropriate safety precautions. It does not represent a warranty of any product properties and we assume no liability for any loss or injury which may result from the use of this information. Users should conduct their own investigations to determine the suitability of the information.

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