

## SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Revision Date 23.05.2011

Version 6.5

### SECTION 1. Identification of the substance/mixture and of the company/undertaking

#### 1.1 Product identifier

|                           |  |
|---------------------------|--|
| Catalogue No.             | 820281   |
| Product name              | 2-Chlorobutane for synthesis   |
| REACH Registration Number | A registration number is not available for this substance as the substance or its use are exempted from registration according to Article 2 REACH Regulation (EC) No 1907/2006, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline. |

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

|                 |   |
|-----------------|---|
| Identified uses | Chemical for synthesis<br>For additional information on uses please refer to the Merck Chemicals portal ( <a href="http://www.merck-chemicals.com">www.merck-chemicals.com</a> ). |
|-----------------|---|

#### 1.3 Details of the supplier of the safety data sheet

|                        |   |
|------------------------|---|
| Company                | Merck KGaA * 64271 Darmstadt * Germany * Phone:+49 6151 72-0                          |
| Responsible Department | LS-QHC * e-mail: <a href="mailto:prodsafe@merckgroup.com">prodsafe@merckgroup.com</a> |

|                                |   |
|--------------------------------|---|
| 1.4 Emergency telephone number | Please contact the regional company representation in your country. |
|--------------------------------|---|

### SECTION 2. Hazards identification

#### 2.1 Classification of the substance or mixture

**Classification (REGULATION (EC) No 1272/2008)**

Flammable liquid, Category 2, H225

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

**Classification (67/548/EEC or 1999/45/EC)**

F Highly flammable R11

For the full text of the R-phrases mentioned in this Section, see Section 16.

#### 2.2 Label elements

**Labelling (REGULATION (EC) No 1272/2008)**

*Hazard pictograms*



*Signal word*

Danger

*Hazard statements*

H225 Highly flammable liquid and vapour.

*Precautionary statements*

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P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.  
P223 Keep away from any possible contact with water, because of violent reaction and possible flash fire.  
P403 + P235 Store in a well-ventilated place. Keep cool.

**Reduced labelling (≤125 ml)**

*Hazard pictograms*



*Signal word*  
Danger

CAS-No. 78-86-4

**Labelling (67/548/EEC or 1999/45/EC)**

*Symbol(s)*  F Highly flammable

*R-phrases(s)* 11 Highly flammable.

*S-phrases(s)* 9-16 Keep container in a well-ventilated place. Keep away from sources of ignition - No smoking.

EC-No. 201-151-7

**Reduced labelling (≤125 ml)**

*Symbol(s)*  F Highly flammable

**2.3 Other hazards**

None known.

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**SECTION 3. Composition/information on ingredients**

|            |   |   |
|------------|---|---|
| Formula    | CH <sub>3</sub> CH <sub>2</sub> CHClCH <sub>3</sub> | C <sub>4</sub> H <sub>9</sub> Cl (Hill) |
| CAS-No.    | 78-86-4   |   |
| EC-No.     | 201-151-7   |   |
| Molar mass | 92,56 g/mol   |   |

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**SECTION 4. First aid measures**

**4.1 Description of first aid measures**

After inhalation: fresh air.

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

After eye contact: rinse out with plenty of water with the eyelid held wide open. Call in ophthalmologist if necessary.

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

**4.2 Most important symptoms and effects, both acute and delayed**

The following applies to aliphatic halogenated hydrocarbons in general: systemic effect: narcosis, cardiovascular disorders. Toxic effect on liver, kidneys.

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**4.3 Indication of any immediate medical attention and special treatment needed**

No information available.

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**SECTION 5. Fire-fighting measures**

**5.1 Extinguishing media**

*Suitable extinguishing media*

Carbon dioxide (CO<sub>2</sub>), Foam, Dry powder

*Unsuitable extinguishing media*

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

**5.2 Special hazards arising from the substance or mixture**

Combustible material, Vapours are heavier than air and may spread along floors.

Pay attention to flashback.

Forms explosive mixtures with air at ambient temperatures.

Development of hazardous combustion gases or vapours possible in the event of fire.

Fire may cause evolution of:

Hydrogen chloride gas, Phosgene

**5.3 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*

Cool closed containers exposed to fire with water spray. Suppress (knock down) gases/vapours/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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**SECTION 6. Accidental release measures**

**6.1 Personal precautions, protective equipment and emergency procedures**

Advice for non-emergency personnel: Avoid substance contact. Do not breathe vapours, aerosols. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.

Advice for emergency responders: Protective equipment see section 8.

**6.2 Environmental precautions**

Do not empty into drains. Risk of explosion.

**6.3 Methods and materials for containment and cleaning up**

Cover drains. Collect, bind, and pump off spills.

Observe possible material restrictions (see sections 7.2 and 10.5).

Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

**6.4 Reference to other sections**

Indications about waste treatment see section 13.

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**SECTION 7. Handling and storage**

**7.1 Precautions for safe handling**

Observe label precautions.

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*Advice on protection against fire and explosion*

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

**7.2 Conditions for safe storage, including any incompatibilities**

Requirements for storage areas and containers Do not use light-weight-metal containers.

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

Store at +15°C to +25°C.

**7.3 Specific end uses**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

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**SECTION 8. Exposure controls/personal protection**

**8.1 Control parameters**

**8.2 Exposure controls**

**Engineering measures**

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

See section 7.1.

**Individual protection measures**

Protective clothing needs to be selected specifically for the workplace, depending on concentrations and quantities of the hazardous substances handled. The chemical resistance of the protective equipment should be enquired at the respective supplier.

*Hygiene measures*

Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

*Eye/face protection*

Safety glasses

*Hand protection*

full contact:

|                     |           |
|---------------------|-----------|
| Glove material:     | Viton (R) |
| Glove thickness:    | 0,70 mm   |
| Break through time: | > 480 min |

splash contact:

|                     |              |
|---------------------|--------------|
| Glove material:     | butyl-rubber |
| Glove thickness:    | 0,7 mm       |
| Break through time: | > 10 min     |

The protective gloves to be used must comply with the specifications of EC Directive 89/686/EEC and the related standard EN374, for example KCL 890 Vitoject® (full contact), KCL 898 Butoject® (splash contact).

The breakthrough times stated above were determined by KCL in laboratory tests acc. to EN374 with samples of the recommended glove types.

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This recommendation applies only to the product stated in the safety data sheet(>,<)> supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: [www.kcl.de](http://www.kcl.de)).

*Other protective equipment*

Flame retardant antistatic protective clothing

*Respiratory protection*

required when vapours/aerosols are generated.

Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds

The entrepreneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

**Environmental exposure controls**

Do not empty into drains.

Risk of explosion.

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**SECTION 9. Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

|                             |                                   |
|-----------------------------|-----------------------------------|
| Form                        | liquid                            |
| Colour                      | colourless                        |
| Odour                       | characteristic                    |
| Odour Threshold             | No information available.         |
| pH                          | 7<br>at 20 °C<br>Aqueous solution |
| Melting point               | -132 °C                           |
| Boiling point/boiling range | 65 °C<br>at 1.013 hPa             |
| Flash point                 | -10 °C                            |
| Evaporation rate            | No information available.         |
| Flammability (solid, gas)   | No information available.         |
| Lower explosion limit       | 2,0 %(V)                          |
| Upper explosion limit       | 8,8 %(V)                          |
| Vapour pressure             | 160 hPa<br>at 20 °C               |
| Relative vapour density     | No information available.         |

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|  |  |
|--|--|
| Relative density                       | 0,87 g/cm <sup>3</sup><br>at 20 °C   |
| Water solubility                       | 1,0 g/l<br>at 25 °C  |
| Partition coefficient: n-octanol/water | log Pow: 2,33<br>(experimental)<br>(Lit.) Bioaccumulation is not expected. |
| Autoignition temperature               | No information available.  |
| Decomposition temperature              | No information available.  |
| Viscosity, dynamic                     | No information available.  |
| Explosive properties                   | No information available.  |
| Oxidizing properties                   | No information available.  |

#### 9.2 Other data

|                      |        |
|----------------------|--------|
| Ignition temperature | 460 °C |
|----------------------|--------|

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### SECTION 10. Stability and reactivity

#### 10.1 Reactivity

Vapours may form explosive mixture with air.

#### 10.2 Chemical stability

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

#### 10.3 Possibility of hazardous reactions

Violent reactions possible with:

Strong oxidizing agents, Metals, Alkali metals, Alkaline earth metals, Copper

#### 10.4 Conditions to avoid

Warming.

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

#### 10.5 Incompatible materials

various plastics

#### 10.6 Hazardous decomposition products

in the event of fire: See chapter 5.

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### SECTION 11. Toxicological information

#### 11.1 Information on toxicological effects

*Acute oral toxicity*

LD50 rat: 17.400 mg/kg (RTECS)

*Acute inhalation toxicity*

LCLO rat: 30,79 mg/l; 4 h (RTECS)

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*Acute dermal toxicity*

LD50 rabbit: 17.400 mg/kg (RTECS)

*Specific target organ toxicity - single exposure*

The substance or mixture is not classified as specific target organ toxicant, single exposure.

*Specific target organ toxicity - repeated exposure*

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

*Aspiration hazard*

Based on available data the classification criteria are not met.

**11.2 Further information**

Hazardous properties cannot be excluded but are unlikely when the product is handled appropriately.

Other information

The following applies to aliphatic halogenated hydrocarbons in general: systemic effect: narcosis, cardiovascular disorders. Toxic effect on liver, kidneys.

Further data:

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

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**SECTION 12. Ecological information**

**12.1 Toxicity**

No information available.

**12.2 Persistence and degradability**

No information available.

**12.3 Bioaccumulative potential**

*Partition coefficient: n-octanol/water*

log Pow: 2,33

(experimental)

(Lit.) Bioaccumulation is not expected.

**12.4 Mobility in soil**

No information available.

**12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

**12.6 Other adverse effects**

*Additional ecological information*

Discharge into the environment must be avoided.

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**SECTION 13. Disposal considerations**

*Waste treatment methods*

See [www.retrologistik.com](http://www.retrologistik.com) for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

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**SECTION 14. Transport information**

**ADR/RID**

UN 1127 CHLOROBUTANES, 3, II

**IATA**

UN 1127 CHLOROBUTANES, 3, II

**IMDG**

UN 1127 CHLOROBUTANES, 3, II

EmS F-E S-D

The transport regulations are cited according to international regulations and in the form applicable in Germany. Possible national deviations in other countries are not considered.

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**SECTION 15. Regulatory information**

**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

*EU regulations*

Major Accident Hazard 96/82/EC  
Legislation Highly flammable  
7b  
Quantity 1: 5.000 t  
Quantity 2: 50.000 t

Occupational restrictions Take note of Dir 94/33/EC on the protection of young people at work.

Storage class 3

**15.2 Chemical Safety Assessment**

For this product a chemical safety assessment was not carried out.

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**SECTION 16. Other information**

**Full text of H-Statements referred to under sections 2 and 3.**

H225 Highly flammable liquid and vapour.

**Full text of R-phrases referred to under sections 2 and 3**

R11 Highly flammable.

**Training advice**

Provide adequate information, instruction and training for operators.

**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](http://www.wikipedia.org).

**Regional representation**

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|               |                              |
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This information is given on the authorised Safety Data Sheet for your country.

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*The information contained herein is based on the present state of our knowledge. It characterises the product with regard to the appropriate safety precautions. It does not represent a guarantee of any properties of the product.*