1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Crotyl chloride
Product Number: 28115
Brand: Aldrich
Supplier: Sigma-Aldrich
Supplier Address: 3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Toxic by ingestion, Corrosive, Skin sensitiser, Target Organ Effect

Target Organs
Eyes

Other hazards which do not result in classification
Lachrymator.

GHS Classification
Flammable liquids (Category 2)
Acute toxicity, Oral (Category 4)
Acute toxicity, Inhalation (Category 4)
Skin corrosion (Category 1B)
Serious eye damage (Category 1)
Skin sensitisation (Category 1)
Acute aquatic toxicity (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger
Hazard statement(s)
H225 Highly flammable liquid and vapour.
H302 + H332 Harmful if swallowed or if inhaled
H314 Causes severe skin burns and eye damage.
H317 May cause an allergic skin reaction.
H402 Harmful to aquatic life.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor/ physician.

**HMIS Classification**
- Health hazard: 3
- Chronic Health Hazard: *
- Flammability: 3
- Physical hazards: 0

**NFPA Rating**
- Health hazard: 3
- Fire: 3
- Reactivity Hazard: 0

**Potential Health Effects**
- **Inhalation** May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
- **Skin** May be harmful if absorbed through skin. Causes skin burns.
- **Eyes** Causes eye burns.
- **Ingestion** Toxic if swallowed.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Synonyms**: cis,trans-1-Chloro-2-butene

**Formula**: C\textsubscript{4}H\textsubscript{7}Cl

**Molecular Weight**: 90.55 g/mol

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Chlorobut-2-ene</td>
<td>Flam. Liq. 2; Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; H225, H302, H315, H318, H332</td>
<td>60 - 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>591-97-9</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>209-739-5</td>
<td></td>
</tr>
</tbody>
</table>

| 3-Chlorobut-1-ene | Flam. Liq. 2; Skin Sens. 1; H225, H317 | 30 - 60 % |
|CAS-No. | 563-52-0 |   |
|EC-No. | 209-252-8 |   |

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

### 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 5. FIREFIGHTING MEASURES

**Conditions of flammability**
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for firefighters**
Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

**Further information**
Use water spray to cool unopened containers.

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6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Splash contact**
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 120 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Eye protection**
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
- **Form**: clear, liquid
- **Colour**: colourless

**Safety data**
- **pH**: no data available
- **Melting point/freezing point**: Melting point/range: -65 °C (-85 °F)
- **Boiling point**: 85 - 86 °C (185 - 187 °F) - lit.
- **Flash point**: -12 °C (10 °F) - closed cup - DIN 51755 Part 1
- **Ignition temperature**: 510 °C (950 °F)
- **Auto-ignition temperature**: no data available
- **Lower explosion limit**: no data available
- **Upper explosion limit**: no data available
- **Vapour pressure**: 116 hPa (87 mmHg) at 20 °C (68 °F)
- **Density**: 0.923 g/mL at 20 °C (68 °F)
- **Water solubility**: ca.14 g/l at 20 °C (68 °F) - hydrolyses
- **Partition coefficient: n-octanol/water**: no data available
- **Viscosity, dynamic**: 0.4 mPa.s at 20 °C (68 °F)
- **Relative vapour density**: no data available
- **Odour**: pungent
- **Odour Threshold**: no data available
- **Evaporation rate**: no data available

### 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of hazardous reactions**
Vapours may form explosive mixture with air.

**Conditions to avoid**
Heat, flames and sparks. Extremes of temperature and direct sunlight.

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

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**11. TOXICOLOGICAL INFORMATION**

**Acute toxicity**

**Oral LD50**
LD50 Oral - rat - 385 mg/kg
no data available

**Inhalation LC50**
LC50 Inhalation - rat - 4 h - 16.3 mg/l
no data available

**Dermal LD50**
no data available

*Other information on acute toxicity*
no data available

**Skin corrosion/irritation**
Skin - rabbit - Corrosive - 4 h - OECD Test Guideline 404

**Serious eye damage/eye irritation**
Eyes - rabbit - Moderate eye irritation - OECD Test Guideline 405

**Respiratory or skin sensitisation**
Buehler Test - guinea pig - OECD Test Guideline 406 - May cause allergic skin reaction.

**Germ cell mutagenicity**
no data available

Genotoxicity in vitro - Ames test - S. typhimurium - positive

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

**Reproductive toxicity**
no data available

**Teratogenicity**
Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation
May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

Ingestion
Toxic if swallowed.

Skin
May be harmful if absorbed through skin. Causes skin burns.

Eyes
Causes eye burns.

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea

Synergistic effects
no data available

Additional Information
RTECS: EM4264000

12. ECOLOGICAL INFORMATION

Toxicity
no data available

Toxicity to daphnia and other aquatic invertebrates
Immobilization EC50 - Daphnia magna (Water flea) - 42 mg/l - 48 h

Persistence and degradability
Biodegradability
Biotic/Aerobic
Result: 25 % - Not readily biodegradable.

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2924   Class: 3 (8)   Packing group: II
Proper shipping name: Flammable liquids, corrosive, n.o.s. (1-Chlorobut-2-ene, 3-Chlorobut-1-ene)
Reportable Quantity (RQ):
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2924   Class: 3 (8)   Packing group: II
Proper shipping name: FLAMMABLE LIQUID, CORROSIVE, N.O.S. (1-Chlorobut-2-ene, 3-Chlorobut-1-ene)
Marine pollutant: No

IATA
UN number: 2924   Class: 3 (8)   Packing group: II
Proper shipping name: Flammable liquid, corrosive, n.o.s. (1-Chlorobut-2-ene, 3-Chlorobut-1-ene)

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Toxic by ingestion, Corrosive, Skin sensitiser, Target Organ Effect

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

SARA 313 Components
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 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

\[
\begin{array}{ll}
1-\text{Chlorobut-2-ene} & \text{CAS-No.} \, 591-97-9, \text{Revision Date} \, 1993-04-24 \\
\end{array}
\]

Pennsylvania Right To Know Components

\[
\begin{array}{ll}
1-\text{Chlorobut-2-ene} & \text{CAS-No.} \, 591-97-9, \text{Revision Date} \, 1993-04-24 \\
3-\text{Chlorobut-1-ene} & \text{CAS-No.} \, 563-52-0 \\
\end{array}
\]

New Jersey Right To Know Components

\[
\begin{array}{ll}
1-\text{Chlorobut-2-ene} & \text{CAS-No.} \, 591-97-9, \text{Revision Date} \, 1993-04-24 \\
3-\text{Chlorobut-1-ene} & \text{CAS-No.} \, 563-52-0 \\
\end{array}
\]

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

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

| Acute Tox. | Acute toxicity |
| Eye Dam. | Serious eye damage |
| Flam. Liq. | Flammable liquids |
| H225 | Highly flammable liquid and vapour. |
| H302 | Harmful if swallowed. |
| H315 | Causes skin irritation. |
| H317 | May cause an allergic skin reaction. |
| H318 | Causes serious eye damage. |
H332 Harmful if inhaled.
Skin Irrit. Skin irritation
Skin Sens. Skin sensitisation

Further information
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