1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers
Product name : Chloroform

Product Number : 650471
Brand : Sigma-Aldrich

CAS-No. : 67-66-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet
Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number
Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure (Category 1), Liver, Kidney, H372
Acute aquatic toxicity (Category 3), H402

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

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word : Danger

Hazard statement(s)
H302 : Harmful if swallowed.
H315 : Causes skin irritation.
H319 : Causes serious eye irritation.
H331 : Toxic if inhaled.
H336 : May cause drowsiness or dizziness.
H351 : Suspected of causing cancer.
H361 Suspected of damaging fertility or the unborn child.
H372 Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure.
H402 Harmful to aquatic life.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P323 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms: Trichloromethane
Methylidyne trichloride

Formula: CHCl₃
Molecular weight: 119.38 g/mol
CAS-No.: 67-66-3

Hazardous components

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroform</td>
<td>Acute Tox. 4; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; Repir. 2; STOT SE 3; STOT RE 1; Aquatic Acute 3; H302, H315, H319, H331, H336, H351, H361, H372, H402</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

| Ethanol | Flam. Liq. 2; Eye Irrit. 2A; H225, H319 | >= 1 - < 5 % |

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

4.1 Description of 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
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 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.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

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.
### 7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

### 8. EXPOSURE CONTROLS/PERSOAL PROTECTION

#### 8.1 Control parameters

**Components with workplace control parameters**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroform</td>
<td>67-66-3</td>
<td>TWA 10.000000 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks**
- Central Nervous System impairment
- Liver damage
- Embryo/fetal damage
- Confirmed animal carcinogen with unknown relevance to humans

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST</td>
<td></td>
<td>2.000000 ppm 9.780000 mg/m³</td>
<td>USA, NIOSH Recommended Exposure Limits</td>
<td></td>
</tr>
</tbody>
</table>

**Potential Occupational Carcinogen**
See Appendix A

<table>
<thead>
<tr>
<th>Component</th>
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</table>

**Potential Occupational Carcinogen**
See Appendix A

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<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td></td>
<td>10 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
</tbody>
</table>

**Ethanol**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>64-17-5</td>
<td>1,000.000000 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
</tbody>
</table>

Upper Respiratory Tract irritation
Confirmed animal carcinogen with unknown relevance to humans

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>1,000 ppm</td>
<td>USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</td>
<td></td>
</tr>
<tr>
<td>PEL</td>
<td>2 ppm 9.78 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</tbody>
</table>

The value in mg/m³ is approximate.
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<th>TWA</th>
<th>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</th>
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<tbody>
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<td>The value in mg/m3 is approximate.</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td></td>
<td>STEL</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper Respiratory Tract irritation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirmed animal carcinogen with unknown relevance to humans</td>
</tr>
</tbody>
</table>

### 8.2 Exposure controls

#### Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

#### Personal protective equipment

**Eye/face protection**
- Face shield and safety glasses
- Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin 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.

**Full contact**
- Material: Fluorinated rubber
- Minimum layer thickness: 0.7 mm
- Break through time: 480 min
- Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

**Splash contact**
- Material: Fluorinated rubber
- Minimum layer thickness: 0.7 mm
- Break through time: 480 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.

#### Body Protection
- Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Respiratory protection
- Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type AXBEK (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).

#### Control of environmental exposure
- Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance
   - Form: liquid, clear
   - Colour: colourless

b) Odour
   - No data available

c) Odour Threshold
   - No data available

d) pH
   - No data available

e) Melting point/freezing point
   - Melting point/range: -63 °C (-81 °F) - lit.

f) Initial boiling point and boiling range
   - 60.5 - 61.5 °C (140.9 - 142.7 °F) - lit.

g) Flash point
   - No data available

h) Evaporation rate
   - No data available

i) Flammability (solid, gas)
   - No data available

j) Upper/lower flammability or explosive limits
   - No data available

k) Vapour pressure
   - 213.3 hPa (160.0 mmHg) at 20.0 °C (68.0 °F)

l) Vapour density
   - No data available

m) Relative density
   - 1.492 g/mL at 25 °C (77 °F)
   - 1.48 g/mL at 25 °C (77 °F)

n) Water solubility
   - No data available

o) Partition coefficient: n-octanol/water
   - log Pow: 1.97

p) Auto-ignition temperature
   - No data available

q) Decomposition temperature
   - No data available

r) Viscosity
   - No data available

s) Explosive properties
   - No data available

t) Oxidizing properties
   - No data available

9.2 Other safety information

- Surface tension: 27.1 mN/m at 20.0 °C (68.0 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
   - No data available

10.2 Chemical stability
   - Stable under recommended storage conditions.
   - Contains the following stabiliser(s):
     - Ethanol (>=0.5 - <=1 %)

10.3 Possibility of hazardous reactions
   - No data available

10.4 Conditions to avoid
   - No data available

10.5 Incompatible materials
   - Strong oxidizing agents, Strong bases, Magnesium, Sodium/sodium oxides, Lithium
10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

**Acute toxicity**
No data available

LD50 Oral - Rat - 908 mg/kg

Inhalation: No data available
LOEC Inhalation - Rat - male - 6 h - 500 ppm
Dermal: No data available
LD50 Dermal - Rabbit - > 20,000 mg/kg
No data available

**Skin corrosion/irritation**
No data available
Skin - Rabbit
Result: Irritating to skin. - 24 h

**Serious eye damage/eye irritation**
No data available
Eyes - Rabbit
Result: Irritating to eyes. - 24 h

**Respiratory or skin sensitisation**
No data available
Did not cause sensitisation on laboratory animals.

**Germ cell mutagenicity**
No data available

Laboratory experiments have shown mutagenic effects.

**Carcinogenicity**
Carcinogenicity - Rat - Oral
Tumorigenic: Carcinogenic by RTECS criteria. Leukaemia

The National Cancer Institute (NCI) has found clear evidence for carcinogenicity. Limited evidence of a carcinogenic effect.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Chloroform)
NTP: Reasonably anticipated to be a human carcinogen (Chloroform)
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
Suspected of damaging the unborn child. Suspected human reproductive toxicant
No data available

**Specific target organ toxicity - single exposure**
No data available
Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Vomiting, Gastrointestinal disturbance, Exposure to and/or consumption of alcohol may increase toxic effects.

Vomiting, Gastrointestinal disturbance, Exposure to and/or consumption of alcohol may increase toxic effects.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence (Ethanol)

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

Toxicity to fish
- LC50 - Leuciscus idus (Golden orfe) - 162 mg/l - 48 h
- LC100 - Leuciscus idus (Golden orfe) - 220 mg/l - 48 h
- LC50 - other fish - 97 mg/l - 96 h
- LC50 - Danio rerio (zebra fish) - 121 mg/l - 96 h
- NOEC - Oryzias latipes - 122 mg/l - 10 d
- NOEC - Oncorhynchus mykiss (rainbow trout) - 24 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates
- EC50 - Daphnia magna (Water flea) - 79.00 mg/l - 24 h
- Immobilization EC50 - Daphnia magna (Water flea) - 51.6 mg/l - 48 h
- NOEC - Daphnia magna (Water flea) - 120 mg/l - 11 d

Toxicity to algae
- EC50 - No information available - 500.00 mg/l - 24 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data 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
Harmful to aquatic life.
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1888  Class: 6.1  Packing group: III
Proper shipping name: Chloroform  Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1888  Class: 6.1  Packing group: III  EMS-No: F-A, S-A
Proper shipping name: CHLOROFORM

IATA
UN number: 1888  Class: 6.1  Packing group: III
Proper shipping name: Chloroform

15. REGULATORY INFORMATION

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroform</td>
<td>67-66-3</td>
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</tbody>
</table>

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

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</table>

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

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<th>Revision Date</th>
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</thead>
<tbody>
<tr>
<td>Chloroform</td>
<td>67-66-3</td>
</tr>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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California Prop. 65 Components
WARNING! This product contains a chemical known to the state of California to cause cancer.

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WARNING: This product contains a chemical known to the state of California to cause birth defects or other reproductive harm.

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16. OTHER INFORMATION

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

Acute Tox.  Acute toxicity
Aquatic Acute Acute aquatic toxicity
Carc. Carcinogenicity
Eye Irrit. Eye irritation
Flam. Liq. Flammable liquids
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H336 May cause drowsiness or dizziness.
H351 Suspected of causing cancer.
H361 Suspected of damaging fertility or the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.
H402 Harmful to aquatic life.
Repr. Reproductive toxicity
Skin Irrit. Skin irritation
STOT RE Specific target organ toxicity - repeated exposure
STOT SE Specific target organ toxicity - single exposure

HMIS Rating
Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

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

Further information
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Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.13 Revision Date: 08/10/2016 Print Date: 03/29/2017