SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Formic acid
Product Number: 251364
Brand: Sigma-Aldrich
Index-No.: 607-001-00-0
REACH No.: 01-2119491174-37-XXXX
CAS-No.: 64-18-6

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

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES
Telephone: +1 314 771-5765
Fax: +1 800 325-5052

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

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Flammable liquids (Category 3), H226
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Skin corrosion (Sub-category 1A), H314
Serious eye damage (Category 1), H318

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

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
The life science business of Merck operates as MilliporeSigma in
the US and Canada.

Pictogram

Signal word Danger

Hazard statement(s)
H226 Flammable liquid and vapor.
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.

Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.
P301 + P312 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately 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.

Supplemental Hazard information (EU)
EUH071 Corrosive to the respiratory tract.

Reduced Labeling (<= 125 ml)

Pictogram

Signal word Danger

Hazard statement(s)
H314 Causes severe skin burns and eye damage.

Precautionary statement(s)
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately 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.

Supplemental Hazard information (EU)
EUH071 Corrosive to the respiratory tract.

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
SECTION 3: Composition/information on ingredients

3.1 Substances

| Formula | CH$_2$O$_2$ |
| Molecular weight | 46.03 g/mol |
| CAS-No. | 64-18-6 |
| EC-No. | 200-579-1 |
| Index-No. | 607-001-00-0 |

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>Flam. Liq. 3; Acute Tox. 4; Acute Tox. 3; Skin Corr. 1A; Eye Dam. 1; H226, H302, H331, H314, H318</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>64-18-6</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>200-579-1</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>607-001-00-0</td>
<td></td>
</tr>
<tr>
<td>Concentration limits:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;= 90 %: Skin Corr. 1A, H314; 10 - &lt; 90 %: Skin Corr. 1B, H314; 2 - &lt; 10 %: Skin Irrit. 2, H315; 2 - &lt; 10 %: Eye Irrit. 2, H319; &gt; 78.5 %: Acute Tox. 3, H331; 75 - 78.5 %: Acute Tox. 4, H332; &gt; 75 %: , EUH071;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aider needs to protect himself. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Pulmonary failure possible after aspiration of vomit. Call a physician immediately. Do not attempt to neutralise.

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

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) 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
Nature of decomposition products not known.
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 vapours possible in the event of fire.

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

5.4 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

6.1 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. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter 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 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.
Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Vent periodically. Handle and open container with care. Hygroscopic.

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

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

8.2 Exposure controls

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
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).

Full contact
Material: Chloroprene
Minimum layer thickness: 0.65 mm
Break through time: 480 min
Material tested: KCL 720 Camapren®

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).

Splash contact
Material: Latex gloves
Minimum layer thickness: 0.6 mm
Break through time: 60 min
Material tested: Lapren® (KCL 706 / Aldrich Z677558, Size M)

Body Protection
Flame retardant antistatic protective clothing.
**Respiratory protection**  
Recommended Filter type: Filter E-(P3)

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.

**Control of environmental exposure**  
Do not let product enter drains. Risk of explosion.

### SECTION 9: Physical and chemical properties

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance Form: liquid</td>
<td></td>
</tr>
<tr>
<td>Color: colorless</td>
<td></td>
</tr>
<tr>
<td>b) Odor</td>
<td>stinging</td>
</tr>
<tr>
<td>c) Odor Threshold</td>
<td>0,02 ppm</td>
</tr>
<tr>
<td>d) pH</td>
<td>2,2 at 10 g/l at 20 °C</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: 8,2 - 8,4 °C - lit.</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>100 - 101 °C - lit.</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>49,5 °C - closed cup - Regulation (EC) No. 440/2008, Annex, A.9</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>Upper explosion limit: 38 %(V)</td>
</tr>
<tr>
<td></td>
<td>Lower explosion limit: 18 %(V)</td>
</tr>
<tr>
<td>k) Vapor pressure</td>
<td>171 hPa at 50 °C - OECD Test Guideline 104</td>
</tr>
<tr>
<td>l) Vapor density</td>
<td>1,59 - (Air = 1.0)</td>
</tr>
<tr>
<td>m) Relative density</td>
<td>1,22 at 20 °C - OECD Test Guideline 109</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>at 20 °C miscible in all proportions, (experimental)</td>
</tr>
<tr>
<td>o) Partition coefficient: n-octanol/water</td>
<td>log Pow: -2,1 at 23 °C - OECD Test Guideline 107</td>
</tr>
<tr>
<td></td>
<td>Bioaccumulation is not expected.</td>
</tr>
<tr>
<td>p) Autoignition temperature</td>
<td>528 °C</td>
</tr>
<tr>
<td></td>
<td>at 1.008 hPa - Tested according to Directive 92/69/EEC.</td>
</tr>
<tr>
<td>q) Decomposition temperature</td>
<td>350 °C</td>
</tr>
<tr>
<td>r) Viscosity</td>
<td>Viscosity, kinematic: 1,47 mm2/s at 20 °C - OECD Test Guideline 114,</td>
</tr>
<tr>
<td></td>
<td>02 mm2/s at 40 °C - OECD Test Guideline 114</td>
</tr>
<tr>
<td></td>
<td>Viscosity, dynamic: 1,8 mPa.s at 20 °C - OECD Test Guideline 114,22</td>
</tr>
<tr>
<td></td>
<td>mPa.s at 40 °C - OECD Test Guideline 114</td>
</tr>
</tbody>
</table>
s) Explosive properties  No data available

t) Oxidizing properties  No data available

9.2 Other safety information

Surface tension  71.5 mN/m at 1g/l at 20 °C
- OECD Test Guideline 115

Dissociation constant  3.7 at 20 °C
- OECD Test Guideline 112

Relative vapor density  1.59 - (Air = 1.0)

SECTION 10: Stability and reactivity

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

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

10.3 Possibility of hazardous reactions
Risk of ignition or formation of flammable gases or vapours with:
Aluminum
Risk of explosion with:
organic nitro compounds
sodium hypochlorite
hydrogen peroxide
furfuryl alcohol
Generates dangerous gases or fumes in contact with:
alkalines
Strong oxidizing agents
sulfuric acid
nonmetallic oxides
metal catalysts
Oxides of phosphorus
Nitric acid
nitrates
Exothermic reaction with:
alkaline earth hydroxides
alkali hydroxides
bases
Amines

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
Strong oxidizing agents, Strong bases, Powdered metals

10.6 Hazardous decomposition products
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 730 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - Rat - male and female - 4 h - 7,85 mg/l
(OECD Test Guideline 403)

Skin corrosion/irritation
Skin - Rabbit
Result: Severe skin irritation
(Draize Test)

Serious eye damage/eye irritation
Causes serious eye damage. Conjunctivitis lacrimal irritation due to vapours.

Respiratory or skin sensitization
Buehler Test - Guinea pig
Result: negative
(OECD Test Guideline 406)
Prolonged or repeated exposure may cause allergic reactions in certain sensitive individuals.

Germ cell mutagenicity
Ames test
Salmonella typhimurium
Result: negative
Sister chromatid exchange assay
Chinese hamster lung cells
Result: negative
Sister chromatid exchange assay
Human lymphocytes
Result: negative
In vitro mammalian cell gene mutation test
Chinese hamster ovary cells
Result: negative
Chromosome aberration test in vitro
Chinese hamster ovary cells
Result: negative
OECD Test Guideline 477
Drosophila melanogaster - male
Result: negative

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.

Reproductive toxicity
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

11.2 Additional Information
Repeated dose toxicity - Rat - male and female - Oral - 52 Weeks - NOAEL (No observed adverse effect level) - 400 mg/kg - LOAEL (Lowest observed adverse effect level) - 2.000 mg/kg
Remarks:
(in analogy to similar products)

RTECS: LQ4900000

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, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Kidney - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
static test LC50 - Danio rerio (zebra fish) - 130 mg/l - 96 h
(OECD Test Guideline 203)
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances: ammonium formate

Toxicity to daphnia and other aquatic invertebrates
static test EC50 - Daphnia magna (Water flea) - 365 mg/l - 48 h
(OECD Test Guideline 202)
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances: ammonium formate

Toxicity to algae
static test ErC50 - Pseudokirchneriella subcapitata - 1.240 mg/l - 72 h
(OECD Test Guideline 201)
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances: ammonium formate

Toxicity to bacteria
static test NOEC - activated sludge - 72 mg/l - 13 d
Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability
aerobic - Exposure time 14 d
Result: 100 % - Readily biodegradable.
(OECD Test Guideline 301C)
Biochemical Oxygen Demand (BOD)  86 mg/g
Remarks: (External MSDS)
Ratio BOD/ThBOD  8.60 %

12.3 Bioaccumulative potential
Bioaccumulation is unlikely.
Does not significantly accumulate in organisms.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Additional ecological  No data available
information

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1779  IMDG: 1779  IATA: 1779

14.2 UN proper shipping name
ADR/RID: FORMIC ACID  IMDG: FORMIC ACID  IATA: Formic acid

14.3 Transport hazard class(es)
ADR/RID: 8 (3)  IMDG: 8 (3)  IATA: 8 (3)

14.4 Packaging group
ADR/RID: II  IMDG: II  IATA: II

14.5 Environmental hazards
ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

**National legislation**

: FLAMMABLE LIQUIDS

**Other regulations**
Observe work restrictions regarding maternity protection in accordance to Dir 92/85/EEC or stricter national regulations where applicable.

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

**15.2 Chemical Safety Assessment**
For this product a chemical safety assessment was not carried out

**SECTION 16: Other information**

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

<table>
<thead>
<tr>
<th>EUH071</th>
<th>Corrosive to the respiratory tract.</th>
</tr>
</thead>
<tbody>
<tr>
<td>H226</td>
<td>Flammable liquid and vapor.</td>
</tr>
<tr>
<td>H302</td>
<td>Harmful if swallowed.</td>
</tr>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage.</td>
</tr>
<tr>
<td>H315</td>
<td>Causes skin irritation.</td>
</tr>
<tr>
<td>H318</td>
<td>Causes serious eye damage.</td>
</tr>
<tr>
<td>H319</td>
<td>Causes serious eye irritation.</td>
</tr>
<tr>
<td>H331</td>
<td>Toxic if inhaled.</td>
</tr>
<tr>
<td>H332</td>
<td>Harmful if inhaled.</td>
</tr>
</tbody>
</table>

**Further information**
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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