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

1.1 Product identifiers
Product name: Perchloric acid
Product Number: 244252
Brand: SIGALD
REACH No.: This product is a mixture. REACH Registration Number see section 3.

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
- Oxidizing liquids (Category 1), H271
- Corrosive to Metals (Category 1), H290
- Acute toxicity, Oral (Category 4), H302
- Skin corrosion (Sub-category 1A), H314
- Serious eye damage (Category 1), H318
- Specific target organ toxicity - repeated exposure (Category 2), Thyroid, H373

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.

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

3.2 Mixtures

Synonyms: PCA

Molecular weight: 100.46 g/mol

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric acid</td>
<td>Ox. Liq. 1; Met. Corr. 1; Acute Tox. 4; Skin Corr. 1A;</td>
<td>&gt;= 70 - &lt; 90%</td>
</tr>
<tr>
<td></td>
<td>Eye Dam. 1; STOT RE 2; H271, H290, H302, H314, H318,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H373</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7601-90-3</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-512-4</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>017-006-00-4</td>
<td></td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2120066865-44-XXXX</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 aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

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). 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
Chlorine
Hydrogen chloride gas
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire. Has a fire-promoting effect due to release of oxygen.

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
Suppress (knock down) gases/vapors/mists with a water spray jet. 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. 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.

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.

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**

No metal containers.

Tightly closed. Separately or together with other oxidising substances only and away from sources of ignition and heat. Because of their oxidation potential these products can raise the burning rate of combustible substances substantially or ignite combustible substances on contact with them.

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**

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.

The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it.

- **Full contact**
  - Material: butyl-rubber
  - Minimum layer thickness: 0,3 mm
  - Break through time: > 480 min
  - Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

- **Splash contact**
  - Material: Nature latex/chloroprene
  - Minimum layer thickness: 0,6 mm
  - Break through time: 420 min
  - Material tested: Lapren® (KCL 706 / Aldrich Z677558, 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 EC 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**
protective clothing

**Respiratory protection**
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.
Recommended Filter type: Filter type ABEK

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.

---

**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><strong>a)</strong> Appearance</td>
<td>Form: liquid, clear&lt;br&gt;Color: colorless</td>
</tr>
<tr>
<td><strong>b)</strong> Odor</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>c)</strong> Odor Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>d)</strong> pH</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>e)</strong> Melting point/freezing point</td>
<td>-18 °C</td>
</tr>
<tr>
<td><strong>f)</strong> Initial boiling point and boiling range</td>
<td>ca.203 °C at 1.013 hPa</td>
</tr>
<tr>
<td><strong>g)</strong> Flash point</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>h)</strong> Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>i)</strong> Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>j)</strong> Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>k)</strong> Vapor pressure</td>
<td>9.1 hPa at 25 °C</td>
</tr>
<tr>
<td><strong>l)</strong> Vapor density</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>m)</strong> Density</td>
<td>1.664 g/mL at 25 °C&lt;br&gt;Relative density</td>
</tr>
<tr>
<td><strong>n)</strong> Water solubility</td>
<td>completely miscible</td>
</tr>
<tr>
<td><strong>o)</strong> Partition coefficient: n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>p)</strong> Autoignition temperature</td>
<td>No data available</td>
</tr>
</tbody>
</table>
q) Decomposition temperature  No data available
r) Viscosity  Viscosity, kinematic: No data available
      Viscosity, dynamic: No data available
s) Explosive properties  Not explosive
t) Oxidizing properties  No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

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

10.3 Possibility of hazardous reactions
Amines and alcohols cause exothermic reactions.

10.4 Conditions to avoid
No information available

10.5 Incompatible materials
Strong bases, Strong acids, Amines, Phosphorus halides, Alcohols, Organic materials,
Powdered metals, Strong reducing agents, Strong oxidizing agents, Metals

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

   Mixture

   Acute toxicity
   LD50 Oral - Rat - < 2.000 mg/kg
   (OECD Test Guideline 423)
   Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:,
   damage of respiratory tract
   Dermal: No data available

   Skin corrosion/irritation
   Mixture causes severe burns.

   Serious eye damage/eye irritation
   Mixture causes serious eye damage. Risk of blindness!

   Respiratory or skin sensitization
   No data available

   Germ cell mutagenicity

The life science business of Merck operates as MilliporeSigma in the US and Canada
Test Type: Ames test  
Test system: Salmonella typhimurium  
Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 471  
Result: negative

**Carcinogenicity**  
No data available

**Reproductive toxicity**  
No data available

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

**Specific target organ toxicity - repeated exposure**  
Mixture may cause damage to organs through prolonged or repeated exposure. - Thyroid

**Aspiration hazard**  
No data available

11.2 **Additional Information**  
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasms, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

**Components**

**Perchloric acid**

**Acute toxicity**  
LD50 Oral - Rat - 1.100 mg/kg  
Lungs, Thorax, or Respiration: Dyspnea.  
(RTECS)  
Inhalation: No data available  
Dermal: No data available

**Skin corrosion/irritation**  
Extremely corrosive and destructive to tissue.

**Serious eye damage/eye irritation**  
Corrosive

**Respiratory or skin sensitization**  
No data available
The life science business of Merck operates as MilliporeSigma in the US and Canada.

**Germ cell mutagenicity**
Test Type: Ames test
Test system: Salmonella typhimurium
Result: negative

**Carcinogenicity**
No data available

**Reproductive toxicity**
No data available

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

**Specific target organ toxicity - repeated exposure**
May cause damage to organs through prolonged or repeated exposure. - Thyroid

**Aspiration hazard**
No data available

---

**SECTION 12: Ecological information**

12.1 **Toxicity**

**Mixture**
Toxicity to daphnia and other aquatic invertebrates Immobilization EC50 - Daphnia magna (Water flea) - > 100 mg/l - 48 h (OECD Test Guideline 202)

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**
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**
Do not empty into drains. Neutralization will not reduce ecotoxic effects.

**Components**

**Perchloric acid**
Toxicity to fish flow-through test EC50 - Lepomis macrochirus (Bluegill sunfish) - 1.470 mg/l - 96 h (US-EPA)
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances:
Sodium perchlorate monohydrate

Toxicity to daphnia and other aquatic invertebrates static test EC50 - Daphnia magna (Water flea) - > 100 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae static test ErC50 - Pseudokirchneriella subcapitata (green algae) - > 435.7 mg/l - 72 h (OECD Test Guideline 201) Remarks: (in analogy to similar products) The value is given in analogy to the following substances: Sodium perchlorate

Toxicity to bacteria static test EC50 - activated sludge - > 1.000 mg/l - 3 h (ISO 8192) Remarks: (in analogy to similar products) The value is given in analogy to the following substances: Sodium perchlorate

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: 1873 IMDG: 1873 IATA: 1873

14.2 UN proper shipping name
ADR/RID: PERCHLORIC ACID IMDG: PERCHLORIC ACID IATA: Perchloric acid Passenger Aircraft: Not permitted for transport

14.3 Transport hazard class(es)
ADR/RID: 5.1 (8) IMDG: 5.1 (8) IATA: 5.1 (8)

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

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

**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.**

- **H271** May cause fire or explosion; strong oxidizer.
- **H272** May intensify fire; oxidizer.
- **H290** May be corrosive to metals.
- **H302** Harmful if swallowed.
- **H314** Causes severe skin burns and eye damage.
- **H315** Causes skin irritation.
- **H318** Causes serious eye damage.
- **H319** Causes serious eye irritation.
- **H373** May cause damage to organs (/$/*_2ORGAN_REPEAT$//) through prolonged or repeated exposure.

**Relevant changes since previous version**

3. Composition/information on ingredients

**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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