SAFETY DATA SHEET

according to Occupational Safety And Health (Classification, Labelling And Safety Data Sheet Of Hazardous Chemicals) Regulations 2013 (CLASS 2013)

Revision Date 29.08.2018 Version 1.4

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

1.1 Product identifier

Catalogue No. 112080

Product name Sulfuric acid 98% for analysis EMSURE®

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.

CAS-No. 7664-93-9

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

Identified uses Reagent for analysis, Chemical production

For additional information on uses please refer to the Merck Chemicals portal (www.merckgroup.com).

1.3 Details of the supplier of the safety data sheet

Company Merck KGaA * 64271 Darmstadt *Germany* Telefon:+49 6151 72-0

Responsible Department LS-QHC * e-mail: prodsafe@merckgroup.com

Regional representation Merck Sdn. Bhd. (Co. No: 178145), No. 4, Jalan U1/26, Section U1, Hicom Glenmarie Industrial Park, 40150 Shah Alam, Selangor. Tel: 03-74943688 Fax: 03-74910850

1.4 Emergency telephone number Customer Call Centre: + 62 0800 140 1253 (Toll Free)
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Catalogue No. 112080
Product name Sulfuric acid 98% for analysis EMSURE®

SECTION 2. Hazards identification

2.1 Classification of the substance or mixture

Classification according to CLASS regulations 2013

Corrosive to metals, Category 1, H290
Skin corrosion, Category 1A, H314

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

2.2 Label elements

Labelling according to CLASS regulations 2013

Hazard pictograms

Signal word
Danger

Hazard statements
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Precautionary statements
Prevention
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
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 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.
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Product name Sulfuric acid 98% for analysis EMSURE®

Reduced labelling (≤125 ml)

Hazard pictograms

Signal word
Danger

Hazard statements
H314 Causes severe skin burns and eye damage.

Precautionary statements
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
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 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.

Index-No. 016-020-00-8

2.3 Other hazards
None known.

SECTIONS 3. Composition/information on ingredients

3.1 Substance

<table>
<thead>
<tr>
<th>Formula</th>
<th>H₂SO₄</th>
<th>H₂O₄S (Hill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index-No.</td>
<td>016-020-00-8</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-639-5</td>
<td></td>
</tr>
<tr>
<td>Molar mass</td>
<td>98.08 g/mol</td>
<td></td>
</tr>
</tbody>
</table>

The Safety Data Sheets for catalogue items are available at www.merckgroup.com
Hazardous components according to CLASS regulations 2013

Chemical name (Concentration)

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Registration number</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>asid sulfurik (&gt;= 50 % - &lt;= 100 %)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Substance does not meet the criteria for PBT or vPvB according to Regulation (EC) No 1907/2006, Annex XIII.*

7664-93-9 *)

- Corrosive to metals, Category 1, H290
- Skin corrosion, Category 1A, H314

*) 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.

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

3.2 Mixture

Not applicable

SECTION 4. First aid measures

4.1 Description of first aid measures

General advice

First aider needs to protect himself.

After inhalation: fresh air. Call in physician.

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

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

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
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Risk of blindness!
Irritation and corrosion, Cough, Shortness of breath
Nausea, Vomiting, Diarrhoea, pain

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

SECTION 5. Firefighting measures
5.1 Extinguishing media
   Suitable extinguishing media
   Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

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

5.2 Special hazards arising from the substance or mixture
   Not combustible.
   Ambient fire may liberate hazardous vapours.
   Fire may cause evolution of:
   Sulphur oxides

5.3 Advice for firefighters
   Special protective equipment 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.

   Further information
   Suppress (knock down) gases/vapours/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 vapours, aerosols. Avoid substance contact. 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 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 with liquid-absorbent and neutralising material (e.g. Chemizorb® H⁺, Merck Art. No. 101595). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
Indications about waste treatment see section 13.

SECTION 7. Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Observe label precautions.

Hygiene measures
Change contaminated clothing and immerse in water. Preventive skin protection Wash hands and face after working with substance.

7.2 Conditions for safe storage, including any incompatibilities
Requirements for storage areas and containers
No metal containers.

Storage conditions
Tightly closed.
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

\textit{asid sulfurik (7664-93-9)}

\begin{tabular}{ll}
MY OEL & Time Weighted Average \  
& 1 mg/m³ (TWA):
\end{tabular}

8.2 Exposure controls

\textbf{Engineering measures}

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

See section 7.1.

\textbf{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.

\textit{Eye/face protection}

Tightly fitting safety goggles

\textit{Hand protection}

full contact:

\begin{tabular}{ll}
Glove material: & Viton (R) \\
Glove thickness: & 0.7 mm \\
Break through time: & > 480 min
\end{tabular}

\textit{splash contact:}
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.

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).

Other protective equipment
Acid-resistant protective clothing

Respiratory protection
required when vapours/aerosols are generated.

Recommended Filter type: filter 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.

Environmental exposure controls
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>Form</td>
<td>liquid</td>
</tr>
<tr>
<td>Colour</td>
<td>colourless</td>
</tr>
</tbody>
</table>

Glove material: butyl-rubber
Glove thickness: 0.7 mm
Break through time: > 120 min
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<td>Product name</td>
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</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour</td>
<td>odourless</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>Not applicable</td>
</tr>
<tr>
<td>pH</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>at 49 g/l</td>
</tr>
<tr>
<td></td>
<td>25 °C</td>
</tr>
<tr>
<td>Melting point</td>
<td>-20 °C</td>
</tr>
<tr>
<td>Boiling point/boiling range</td>
<td>ca. 335 °C</td>
</tr>
<tr>
<td></td>
<td>at 1,013 hPa</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No information available.</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No information available.</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>ca.0.0001 hPa</td>
</tr>
<tr>
<td></td>
<td>at 20 °C</td>
</tr>
<tr>
<td>Relative vapour density</td>
<td>ca.3.4</td>
</tr>
<tr>
<td>Density</td>
<td>1.84 g/cm3</td>
</tr>
<tr>
<td></td>
<td>at 20 °C</td>
</tr>
</tbody>
</table>
# SAFETY DATA SHEET

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<td>Product name</td>
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</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative density</td>
<td>No information available.</td>
</tr>
<tr>
<td>Water solubility</td>
<td>at 20 °C, soluble, (caution! development of heat)</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>No information available.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No information available.</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No information available.</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>ca.24 mPa.s at 20 °C</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not classified as explosive.</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>Oxidizing potential</td>
</tr>
</tbody>
</table>

## 9.2 Other data

<table>
<thead>
<tr>
<th>Property</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition temperature</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Bulk density</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Corrosion</td>
<td>May be corrosive to metals.</td>
</tr>
</tbody>
</table>

## SECTION 10. Stability and reactivity

### 10.1 Reactivity

strong oxidising agent

### 10.2 Chemical stability

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

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The Safety Data Sheets for catalogue items are available at www.merckgroup.com
10.3 Possibility of hazardous reactions

A risk of explosion and/or of toxic gas formation exists with the following substances:

Violent reactions possible with:

Water, Alkali metals, alkali compounds, Ammonia, Aldehydes, acetonitrile, Alkaline earth metals, alkalines, Acids, alkaline earth compounds, Metals, metal alloys, Oxides of phosphorus, phosphorus, hydrides, halogen-halogen compounds, oxyhalogenic compounds, permanganates, nitrates, carbides, combustible substances, organic solvent, acetylidene, Nitriles, organic nitro compounds, anilines, Peroxides, picrates, nitrides, lithium silicide, iron(III) compounds, bromates, chlorates, Amines, perchlorates, hydrogen peroxide

10.4 Conditions to avoid

no information available

10.5 Incompatible materials

animal/vegetable tissues, Metals

Contact with metals liberates hydrogen gas.

10.6 Hazardous decomposition products

in the event of fire: See section 5.

SECTION 11. Toxicological information

11.1 Information on toxicological effects

Acute oral toxicity

This information is not available.

Acute inhalation toxicity

Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:; damage of respiratory tract

Acute dermal toxicity

This information is not available.

Skin irritation

Causes severe burns.
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Catalogue No. 112080
Product name Sulfuric acid 98% for analysis EMSURE®

Eye irritation

Causes serious eye damage.
Risk of blindness!

Sensitisation
This information is not available.

Germ cell mutagenicity
This information is not available.

Carcinogenicity
This information is not available.

Reproductive toxicity
This information is not available.

Teratogenicity
This information is not available.

Specific target organ toxicity - single exposure
This information is not available.

Specific target organ toxicity - repeated exposure
This information is not available.

Aspiration hazard
This information is not available.

11.2 Further information
After inhalation of aerosols: damage to the affected mucous membranes. After skin contact: severe burns with formation of scabs. After eye contact: burns, corneal lesions. After swallowing: severe pain (risk of perforation!), nausea, vomiting and diarrhoea. After a latency period of several weeks possibly pyloric stenosis.
Other dangerous properties can not be excluded.
Handle in accordance with good industrial hygiene and safety practice.

SECTION 12. Ecological information

The Safety Data Sheets for catalogue items are available at www.merckgroup.com
12.1 Toxicity
No information available.

12.2 Persistence and degradability
No information available.

12.3 Bioaccumulative potential
No information available.

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

Biological effects:
Forms corrosive mixtures with water even if diluted. Harmful effect due to pH shift. Endangers drinking-water supplies if allowed to enter soil or water.

Discharge into the environment must be avoided.
SECTION 13. Disposal considerations

_Waste treatment methods_

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

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

According to Quality Environment Regulation (Scheduled Waste) 2005, waste need to be sent to designated premise for recycle, treatment or disposal. Please contact Kualiti Alam for waste classification and correct disposal method.

SECTION 14. Transport information

_Land transport (ADR/RID)_

14.1 UN number  UN 1830
14.2 Proper shipping name  SULPHURIC ACID
14.3 Class  8
14.4 Packing group  II
14.5 Environmentally hazardous  --
14.6 Special precautions for user  yes

_Tunnel restriction code_  E

_Inland waterway transport (ADN)_

Not relevant

_Air transport (IATA)_


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14.1 UN number UN 1830
14.2 Proper shipping name SULPHURIC ACID
14.3 Class 8
14.4 Packing group II
14.5 Environmentally hazardous --
14.6 Special precautions for user no

Sea transport (IMDG)
14.1 UN number UN 1830
14.2 Proper shipping name SULPHURIC ACID
14.3 Class 8
14.4 Packing group II
14.5 Environmentally hazardous --
14.6 Special precautions for user yes
EmS F-A  S-B

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not relevant

SECTION 15. Regulatory information
15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
All national and local regulations, including Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013, if applicable to the use, should be observed.

National legislation
Storage class 8B

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.

H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Training advice
Provide adequate information, instruction and training for operators.

Labelling

Hazard pictograms

Signal word
Danger

Hazard statements
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Precautionary statements
Prevention
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

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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.

Regional representation

Merck Sdn. Bhd. (Co. No: 178145), No. 4, Jalan U1/26, Section U1, Hicom Glenmarie Industrial Park, 40150 Shah Alam, Selangor. Tel: 03-74943688 Fax: 03-74910850

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.