1 Identification
Product identifier
Product name: Copper etchant

Stock number: 44583

Relevant identified uses of the substance or mixture and uses advised against.
Identified use: SU24 Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier:
Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660. After normal business hours, call Carechem 24 at (866) 928-0789.

2 Hazard(s) identification
Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)

GHS05 Corrosion
Skin Corr. 1C H314 Causes severe skin burns and eye damage.

GHS07
Acute Tox. 4 H302 Harmful if swallowed.
Hazard not otherwise classified No information known.

Label elements
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

Hazard pictograms
GHS05 GHS07

Signal word Danger

Hazard-determining components of labeling:
Iron(III) chloride
Hydrochloric acid

Hazard statements
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.

Precautionary statements
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P303+P361+P338 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P303+P361+P338 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P310 Immediately call a POISON CENTER/doctor.
P333 Wash contaminated clothing before reuse.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

WHMIS classification
D2B - Toxic material causing other toxic effects
E - Corrosive material

Classification system
HMIS ratings (scale 0-4) (Hazardous Materials Identification System)

Health (acute effects) = 3
Flammability = 0
Physical Hazard = 1

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients
Chemical characterization: Mixtures

Dangerous components:
7705-08-0 Iron(III) chloride 42.0%
Skin Corr. 1C, H314; Eye Dam. 1, H318; Acute Tox. 4, H302
7647-01-0 Hydrochloric acid 1.1%
Skin Corr. 1B, H314; Eye Dam. 1, H318; STOT SE 3, H335

Additional information None known.

(Contd. on page 2)
Product name: Copper etchant

4 First-aid measures

**Non-Hazardous Ingredients**

| 7732-18-5 | Water | 56.9% |

**First-aid measures**

**Description of first aid measures**

**General information** Immediately remove any clothing soiled by the product.

**After inhalation**

Supply fresh air. If required, provide artificial respiration. Keep patient warm. Seek immediate medical advice.

**After skin contact**

Immediately wash with water and soap and rinse thoroughly. Seek immediate medical advice. After eye contact Rinse opened eye for several minutes under running water. Then consult a doctor.

**After swallowing** Seek medical treatment.

**Information for doctor**

**Most important symptoms and effects, both acute and delayed**

Causes severe skin burns. Harmful if swallowed.

**Indication of any immediate medical attention and special treatment needed** No further relevant information available.

5 Fire-fighting measures

**Extinguishing media**

Suitable extinguishing agents Product is not flammable. Use fire-fighting measures that suit the surrounding fire.

**Special hazards arising from the substance or mixture**

If this product is involved in a fire, the following can be released:

- Hydrogen chloride (HCl)
- Iron oxides

**Advice for firefighters**

**Protective equipment:**

Wear self-contained respirator. Wear fully protective impervious suit.

6 Accidental release measures

**Personal precautions, protective equipment and emergency procedures**

Wear protective equipment. Keep unprotected persons away. Ensure adequate ventilation.

**Environmental precautions**

Do not allow product to reach sewage system or any water course.

**Methods and material for containment and cleaning up:**

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Use neutralizing agent. Dispose of contaminated material as waste according to section 13. Ensure adequate ventilation.

**Prevention of secondary hazards**

No special measures required.

**Reference to other sections**

See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

**Handling**

**Precautions for safe handling**

Keep container tightly sealed. Store in cool, dry place in tightly closed containers. Ensure good ventilation at the workplace.

**Information about protection against explosions and fires:**

The product is not flammable.

**Conditions for safe storage, including any incompatibilities**

**Storage**

Requirements to be met by storerooms and receptacles: No special requirements.

**Information about storage in one common storage facility:**

Store away from strong bases. Water reacts with many metals to give hydrogen, often violently. Water is also incompatible with many reactive organic and inorganic chemicals. Store away from metals. Store away from amines.

**Further information about storage conditions**

Keep container tightly sealed. Store in cool, dry conditions in well sealed containers.

**Specific end use(s)**

No further relevant information available.

8 Exposure controls/personal protection

**Additional information about design of technical systems:**

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

**Control parameters**

**Components with limit values that require monitoring at the workplace:**

| 7705-08-0 | Iron(III) chloride (42.0%) |
| REL (USA) | Long-term value: 1 mg/m³ as Fe |
| TLV (USA) | Long-term value: 1 mg/m³ as Fe |
| EL (Canada) | Short-term value: 2 mg/m³ as Fe |

| 7647-01-0 | Hydrochloric acid (1.1%) |
| PEL (USA) | Ceiling limit value: 7 mg/m³, 5 ppm |
| REL (USA) | Ceiling limit value: 7 mg/m³, 5 ppm |
| TLV (USA) | Ceiling limit value: 2.98 mg/m³, 2 ppm |
| EL (Canada) | Short-term value: C 2 ppm |

(Contd. on page 3)
Additional information: No data

Exposure controls
Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Do not inhale dust / smoke / mist.
Avoid contact with the eyes and skin.
Maintain an ergonomically appropriate working environment.

Breathing equipment: Use suitable respirator when high concentrations are present.

Recommended filter device for short term use:
Use a respirator with multi-purpose combination (US) or type ABEK (EN 14387) as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards such as NIOSH (USA) or CEN (EU).

Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

Eye protection:
Tightly sealed goggles
Full face protection

Body protection: Protective work clothing.

9 Physical and chemical properties

Information on basic physical and chemical properties

General Information
Appearance:
Form: Liquid
Odor: Acrid
Odor threshold: Not determined.

pH-value: Not determined.

Change in condition
Melting point/Melting range: Not determined
Boiling point/Boiling range: Not determined
Sublimation temperature / start: Not determined
Flammability (solid, gaseous) Not determined.
Ignition temperature: Not determined
Decomposition temperature: Not determined

Auto igniting: Product is not selfigniting.

Danger of explosion: Not determined.

Explosion limits:
Lower: Not determined
Upper: Not determined

Vapor pressure: Not determined

Density at 20 °C (68 °F): 1.19 g/cm³ (9.931 lbs/gal)
Relative density Not determined.
Vapor density Not determined.
Evaporation rate Not determined.

Solubility in / Miscibility with
Water: Fully miscible
Partition coefficient (n-octanol/water): Not determined.

Viscosity:
\[ \text{dynamic:} \quad \text{Not determined.} \]
\[ \text{kinematic:} \quad \text{Not determined.} \]

Solvent content:
Organic solvents: 0.0 %

Solids content: 42.0 %

Other information No further relevant information available.

10 Stability and reactivity

Reactivity No information known.

Chemical stability Stable under recommended storage conditions.

Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions
Water reacts with many metals to give hydrogen, often violently. Water is also incompatible with many reactive organic and inorganic chemicals.

Water reacts violently with alkali metals.

Conditions to avoid No further relevant information available.

Incompatible materials:
Bases
Metals
Amines

Hazardous decomposition products:
Hydrogen chloride (HCl)
Iron oxides

11 Toxicological information

Information on toxicological effects

Acute toxicity: Harmful if swallowed.
Swallowing will lead to a strong corrosive effect on mouth and throat and to the danger of perforation of esophagus and stomach.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for components in this product.

LD/LC50 values that are relevant for classification:
7705-08-0 Iron(III) chloride
Oral [LD50] 316 mg/kg (rat)

Skin irritation or corrosion: Causes severe skin burns.
Product name: Copper etchant

(Contd. of page 3)

Eye irritation or corrosion: Causes serious eye damage.
Sensitization: No sensitizing effects known.
Germ cell mutagenicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for components in this product.
Carcinogenicity:
IARC-3: Not classifiable as to carcinogenicity to humans.
ACGIH A4: Not classified as a human carcinogen. Inadequate data on which to classify the agent in terms of its carcinogenicity in humans and/or animals.
Reproductive toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive data for components in this product.
Specific target organ system toxicity - repeated exposure: No effects known.
Specific target organ system toxicity - single exposure: No effects known.
Aspiration hazard: No effects known.
Subacute to chronic toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.
Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
The product shows the following dangers according to internally approved calculation methods for preparations:
Harmful
Corrosive
Carcinogenic categories
OSHA-Ca (Occupational Safety & Health Administration)
None of the ingredients is listed.

12 Ecological information
Toxicity
Aquatic toxicity: No further relevant information available.
Persistence and degradability: No further relevant information available.
Bioaccumulative potential: No further relevant information available.
Mobility in soil: No further relevant information available.
Additional ecological information:
General notes:
Do not allow undiluted product or large quantities to reach ground water, water course or sewage system.
Avoid transfer into the environment.
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
Other adverse effects: No further relevant information available.

13 Disposal considerations
Waste treatment methods
Recommendation Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.
Recommended cleansing agent: Water, if necessary with cleansing agents.

14 Transport information

UN-Number
DOT, IMDG, IATA
UN3264

UN proper shipping name
DOT
Corrosive liquid, acidic, inorganic, n.o.s. (Ferric chloride, Hydrochloric acid)
IMDG, IATA
CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (FERRIC CHLORIDE, HYDROCHLORIC ACID)

Transport hazard class(es)
DOT

Class
Label
8 Corrosive substances.
Class
8 (C1) Corrosive substances
Label
8

IMDG, IATA

Class
8 Corrosive substances.
Label
8

Packing group
DOT, IMDG, IATA
III

Environmental hazards:
DOT, IMDG, IATA
No

Special precautions for user
EMS Number:
F-A,S-B

Segregation groups
Acids

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.

Transport/Additional information:
DOT
Marine Pollutant (DOT):
No

UN "Model Regulation":
UN3264, Corrosive liquid, acidic, inorganic, n.o.s. (Ferric chloride, Hydrochloric acid), 8, III

15 Regulatory information
Safety, health and environmental regulations/legislation specific for the substance or mixture
GHS label elements: The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

(Contd. on page 5)
Product name: Copper etchant

Hazard pictograms

| GHS05 | GHS07 |

Signal word Danger

Hazard-determining components of labeling:
Iron(III) chloride
Hydrochloric acid

Hazard statements
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.

Precautionary statements
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P301+P330+P331 IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P310 Immediately call a POISON CENTER/doctor.
P363 Wash contaminated clothing before reuse.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory. All components of this product are listed on the Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)

<table>
<thead>
<tr>
<th>Substance</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

California Proposition 65
Prop 65 - Chemicals known to cause cancer
None of the ingredients are listed.

Prop 65 - Developmental toxicity
None of the ingredients are listed.

Prop 65 - Developmental toxicity, female
None of the ingredients are listed.

Prop 65 - Developmental toxicity, male
None of the ingredients are listed.

Information about limitation of use: For use only by technically qualified individuals.

Other regulations, limitations and prohibitive regulations

Substances of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.
None of the ingredients are listed.

The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
None of the ingredients is listed.

Annex XIV of the REACH Regulations (requiring Authorisation for use)
None of the ingredients is listed.

Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information for their purpose, and to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing SDS: Global Marketing Department
Date of preparation / last revision 06/17/2016 / -

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
AISG: American Institute of Steel Construction
DOT: US Department of Transportation
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
HMIS: Hazardous Materials Identification System (USA)
HMSI: Hazardous Materials Identification System (International)
LC50: Lethal concentration, 50 percent (inhalation)
LD50: Lethal dose, 50 percent
MSDS: Material Safety Data Sheets
PI: Permeating irritant
PIRA: Permeating irritant and respiratory allergen
pH: Acid or base concentration
Pb: Persistent and Bioaccumulative
PID: Permeating irritant drug
SH:either SH or S-carboxymethylcysteine
SIT: Skin irritation
STOT: Specific-Target Organ Toxicity
TSCA: Toxic Substances Control Act
UVC: Ultraviolet light
WHO: World Health Organization
WHS: Workplace Hazardous Materials Information System (Canada)
XN: Toxicological Linkage Information System
XN: Toxicological Linkage Information System
Y: Year
Z: Year