Section 1. Identification

GHS product identifier : CU-104 products

Other means of identification : CU-104 (033004), CU-104-2 (033019), CU-104-5 (033020)

Product type : Powder.

Relevant identified uses of the substance or mixture and uses advised against
Not applicable.

Supplier’s details : Praxair Surface Technologies, Inc. 1555 Main Street Indianapolis, IN 46224 USA 317-240-2650

Emergency telephone number (with hours of operation) : 317-240-2484 7:00am - 3:30pm ET Mon-Fri Chemtrec: 1-800-424-9300

Section 2. Hazards identification

OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Classification of the substance or mixture : Not classified.

GHS label elements

Signal word : No signal word.

Hazard statements : No known significant effects or critical hazards.

Precautionary statements

Prevention : Not applicable.

Response : Not applicable.

Storage : Not applicable.

Disposal : Not applicable.

Hazard not otherwise classified : Handling and/or processing of this material may generate a dust which can cause mechanical irritation of the eyes, skin, nose and throat.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Other means of identification : CU-104 (033004), CU-104-2 (033019), CU-104-5 (033020)

CAS number/other identifiers

CAS number : Not available.

Product code : CU-104 products

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>%</th>
<th>CAS number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CU-104 products copper</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Aluminum</td>
<td>&gt;75</td>
<td>7440-50-8</td>
</tr>
<tr>
<td>iron</td>
<td>5 - 20</td>
<td>91728-14-2</td>
</tr>
<tr>
<td></td>
<td>1 - 5</td>
<td>7439-89-6</td>
</tr>
</tbody>
</table>
Section 3. Composition/information on ingredients

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.

Ingestion : Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following: irritation, redness

Inhalation : Adverse symptoms may include the following: respiratory tract irritation, coughing

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.
Section 5. Fire-fighting measures

Specific hazards arising from the chemical decomposition products: Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products: Decomposition products may include the following materials: metal oxide/oxides

Special protective actions for fire-fighters: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Environmental precautions: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Small spill: Move containers from spill area. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill: Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures: Put on appropriate personal protective equipment (see Section 8). Avoid breathing dust. Avoid release to the environment.

Advice on general occupational hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Storage: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Exposure limits</th>
</tr>
</thead>
</table>
| copper          | ACGIH TLV (United States, 6/2013).  
TWA: 1 mg/m³, (as Cu) 8 hours. Form: Dust and mist  
TWA: 0.2 mg/m³ 8 hours. Form: Fume  
TWA: 1 mg/m³, (as Cu) 8 hours. Form: Dusts and Mists  
TWA: 0.1 mg/m³, (as Cu) 8 hours. Form: Fume  
NIOSH REL (United States, 10/2013).  
TWA: 1 mg/m³, (as Cu) 10 hours. Form: Dusts and Mists  
OSHA PEL (United States, 2/2013).  
TWA: 1 mg/m³ 8 hours. Form: Dusts and Mists  
TWA: 0.1 mg/m³ 8 hours. Form: Fume |
| Aluminum        | ACGIH TLV (United States, 6/2013).  
TWA: 1 mg/m³ 8 hours. Form: Respirable fraction |

### Appropriate engineering controls

Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

### Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

#### Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

#### Eye/face protection

Safety eyewear complying with an approved standard should be used to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields. If operating conditions cause high dust concentrations to be produced, use dust goggles.

#### Skin protection

- **Hand protection**: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products.
- **Body protection**: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- **Other skin protection**: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- **Respiratory protection**: Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
Section 9. Physical and chemical properties

### Appearance

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid [Powder.]</td>
</tr>
<tr>
<td>Color</td>
<td>Copper</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>pH</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting point</td>
<td>1083°C (1981.4°F)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower and upper explosive (flammable)</td>
<td>Not available</td>
</tr>
<tr>
<td>VOC content</td>
<td>0 lbs/gal (0 g/l)</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not available</td>
</tr>
<tr>
<td>Relative density</td>
<td>Not available</td>
</tr>
<tr>
<td>Solubility</td>
<td>Insoluble in the following materials: cold water and hot water.</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>Not available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not available</td>
</tr>
</tbody>
</table>

Section 10. Stability and reactivity

### Reactivity

- No specific test data related to reactivity available for this product or its ingredients.

### Chemical stability

- The product is stable.

### Possibility of hazardous reactions

- Under normal conditions of storage and use, hazardous reactions will not occur.

### Conditions to avoid

- No specific data.

### Incompatible materials

- No specific data.

### Hazardous decomposition products

- Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

- Not available.

#### Irritation/Corrosion

- Not available.

#### Sensitization

- Not available.

#### Mutagenicity

- Not available.
Section 11. Toxicological information

**Carcinogenicity**
Not available.

**Reproductive toxicity**
Not available.

**Teratogenicity**
Not available.

**Specific target organ toxicity (single exposure)**
Not available.

**Specific target organ toxicity (repeated exposure)**
Not available.

**Aspiration hazard**
Not available.

**Information on the likely routes of exposure**

**Inhalation**
Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

No known significant effects or critical hazards.

**Eye contact**
Adverse symptoms may include the following:
- irritation
- redness

**Inhalation**
Adverse symptoms may include the following:
- respiratory tract irritation
- coughing

**Skin contact**
No known significant effects or critical hazards.

**Ingestion**
No known significant effects or critical hazards.

**Symptoms related to the physical, chemical and toxicological characteristics**

**Eye contact**
Adverse symptoms may include the following:
- irritation
- redness

**Inhalation**
Adverse symptoms may include the following:
- respiratory tract irritation
- coughing

**Skin contact**
No specific data.

**Ingestion**
No specific data.

**Potential acute health effects**

**Eye contact**
Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

No known significant effects or critical hazards.

**Inhalation**
Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

No known significant effects or critical hazards.

**Skin contact**
No known significant effects or critical hazards.

**Ingestion**
No known significant effects or critical hazards.

**Delayed and immediate effects and also chronic effects from short and long term exposure**

**Short term exposure**

**Potential immediate effects**
Not available.

**Potential delayed effects**
Not available.

**Long term exposure**

**Potential immediate effects**
Not available.

**Potential delayed effects**
Not available.

**Potential chronic health effects**
Not available.

**General**
Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.

**Carcinogenicity**
No known significant effects or critical hazards.

**Mutagenicity**
No known significant effects or critical hazards.

**Teratogenicity**
No known significant effects or critical hazards.

**Developmental effects**
No known significant effects or critical hazards.
Section 11. Toxicological information

Fertility effects: No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates
Not available.

Section 12. Ecological information

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>copper</td>
<td>Acute EC50 1100 µg/l</td>
<td>Aquatic plants - Lemna minor</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td>Daphnia - Daphnia longispina - Juvenile (Fledgling, Hatchling, Weanling)</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute IC50 13 µg/l</td>
<td>Algae - Pseudokirchneriella subcapitata - Exponential growth phase</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute IC50 5.4 mg/l</td>
<td>Aquatic plants - Plantae - Exponential growth phase</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Marine water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute LC50 0.072 µg/l</td>
<td>Crustaceans - Amphipoda - Adult</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Marine water</td>
<td>Fish - Periophthalmus waltoni - Adult</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 7.56 µg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 2.5 µg/l</td>
<td>Algae - Nitzschia closterium - Exponential growth phase</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Marine water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 7 mg/l</td>
<td>Aquatic plants - Ceratophyllum demersum</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 0.02 mg/l</td>
<td>Crustaceans - Cambarus bartonii - Mature</td>
<td>21 days</td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 2 µg/l</td>
<td>Daphnia - Daphnia magna</td>
<td>21 days</td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td>Fish - Oreochromis niloticus - Juvenile (Fledgling, Hatchling, Weanling)</td>
<td>6 weeks</td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 0.8 µg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iron</td>
<td>Acute EC50 3700 µg/l</td>
<td>Aquatic plants - Lemna minor</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>Fresh water</td>
<td>Daphnia - Daphnia magna</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Marine water</td>
<td>Crustaceans - Crangon crangon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute LC50 33000 to 100000 µg/l</td>
<td></td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Marine water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute LC50 6.48 µg/l</td>
<td>Fish - Periophthalmus waltoni - Adult</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Marine water</td>
<td>Algae - Glenodinium halli</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 100 mg/l</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Persistence and degradability
Not available.

Bioaccumulative potential
Not available.

Mobility in soil

Soil/water partition coefficient (K<sub>oc</sub>) : Not available.

Other adverse effects : No known significant effects or critical hazards.
Section 13. Disposal considerations

Disposal methods: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

<table>
<thead>
<tr>
<th></th>
<th>DOT Classification</th>
<th>TDG Classification</th>
<th>Mexico Classification</th>
<th>ADR/RID</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN proper shipping name</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Packing group</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Additional information</td>
<td>Reportable quantity</td>
<td>6600.7 lbs / 2996.7 kg</td>
<td>Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Special precautions for user: Transport within user’s premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not available.
Section 15. Regulatory information

U.S. Federal regulations

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)
- Listed

Clean Water Act (CWA) 307: copper

U.S. Federal regulations

Clean Air Act Section 602 Class I Substances: Not listed
Clean Air Act Section 602 Class II Substances: Not listed

DEA List I Chemicals (Precursor Chemicals): Not listed
DEA List II Chemicals (Essential Chemicals): Not listed

SARA 302/304
Composition/information on ingredients
No products were found.

SARA 304 RQ: Not applicable.
SARA 311/312
Classification: Not applicable.
Composition/information on ingredients
No products were found.

SARA 313

<table>
<thead>
<tr>
<th>Product name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form R - Reporting requirements</td>
<td>copper</td>
<td>7440-50-8</td>
</tr>
<tr>
<td>Supplier notification</td>
<td>copper</td>
<td>7440-50-8</td>
</tr>
</tbody>
</table>

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts: The following components are listed: COPPER
New York: The following components are listed: Copper
New Jersey: The following components are listed: COPPER
Pennsylvania: The following components are listed: COPPER FUME

Canada inventory: Not determined.

International regulations

International lists
Australia inventory (AICS): Not determined.
China inventory (IECSC): Not determined.
Japan inventory: Not determined.
Korea inventory: Not determined.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): Not determined.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals: Not listed
Section 15. Regulatory information

<table>
<thead>
<tr>
<th>Chemical Weapons Convention List Schedule II Chemicals</th>
<th>Not listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Weapons Convention List Schedule III Chemicals</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

Section 16. Other information

**History**

<table>
<thead>
<tr>
<th>Date of printing</th>
<th>7/23/2014.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of issue/Date of revision</td>
<td>7/23/2014.</td>
</tr>
</tbody>
</table>

**Key to abbreviations**

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- UN = United Nations

**References**

Not available.

**Notice to reader**

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.