SECTION 1: IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY

1.1 Product identifiers

Product Name : ACS Material Copper Nanowire in Ethanol
Brand : ACS Material LLC
CAS-No. : 7440-50-8 (copper), 64-17-5 (ethanol)

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

Identified uses : Laboratory chemicals, Manufacturing of substances

1.3 Details of the supplier of the safety data sheet

Company : ACS MATERIAL LLC
959 E Walnut St., Suite 100,
Pasadena, CA 91106
Telephone : +1 (866)-227-0656
Fax : +1 (781)-518-0284

1.4 Emergency telephone number

Emergency Phone #: +1 (866)-227-0656

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Flammable liquids (Category 2), H225
Eye irritation (Category 2), H319
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
Pictogram

Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.

Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P370 + P378 In case of fire: Use dry powder or dry sand to extinguish.
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

<table>
<thead>
<tr>
<th>Substance name</th>
<th>Copper Nanowire in Ethanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS-No.</td>
<td>7440-50-8 (copper), 64-17-5 (ethanol)</td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-159-6(copper), 200-578-6 (ethanol)</td>
</tr>
<tr>
<td>Synonyms</td>
<td>Copper, Cu, nanowire</td>
</tr>
</tbody>
</table>

3.2 Mixtures

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>Flam. Liq. 2; Eye Irrit. 2; H225, H319</td>
<td>&gt;= 90 - &lt;= 100%</td>
</tr>
<tr>
<td></td>
<td>Concentration limits:</td>
<td>&gt;= 50%: Eye Irrit. 2A, H319;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>Flam. Sol. 1; Aquatic Acute 1; Aquatic Chronic 3; H228, H400, H412</td>
<td>&gt;= 0,25 - &lt; 1 %</td>
</tr>
<tr>
<td></td>
<td>M-Factor - Aquatic Acute: 10</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
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 **Special hazards arising from the substance or mixture**
Nature of decomposition products not known.

5.3 **Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 **Further information**
Use water spray to cool unopened containers.

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

6.1 **Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 **Environmental precautions**
Do not let product enter drains. Discharge into the environment must be avoided.

6.3 **Methods and materials for containment and cleaning up**
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 **Reference to other sections**
For disposal see section 13.

**SECTION 7: HANDLING AND STORAGE**

7.1 **Precautions for safe handling**
Suitable extinguishing media
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build-up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Recommended storage temperature 2 - 8 °C
Hygroscopic. Air sensitive. Handle and store under inert gas. Do not freeze. Storage class (TRGS 510): Flammable liquids

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

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

8.3 Personal protective equipment

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

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 EU Directive 89/686/EEC and the standard EN 374 derived from it.

Body Protection
Impervious, flame retardant, antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government
Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>No.</th>
<th>Property</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Appearance</td>
<td>Form: suspension</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Colour: brown</td>
</tr>
<tr>
<td>2</td>
<td>Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>3</td>
<td>Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>4</td>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>5</td>
<td>Melting point/freezing point</td>
<td>Melting point: -130°C to -112°C</td>
</tr>
<tr>
<td>6</td>
<td>Initial boiling point and boiling range</td>
<td>Neutral Boiling point: 78.2°C - 78.5°C</td>
</tr>
<tr>
<td>7</td>
<td>Flash point</td>
<td>12°C - 16°C</td>
</tr>
<tr>
<td>8</td>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>9</td>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>10</td>
<td>Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
<tr>
<td>11</td>
<td>Vapour pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>12</td>
<td>Vapour density</td>
<td>No data available</td>
</tr>
<tr>
<td>13</td>
<td>Relative density</td>
<td>No data available</td>
</tr>
<tr>
<td>14</td>
<td>Water solubility</td>
<td>No data available</td>
</tr>
<tr>
<td>15</td>
<td>Partition coefficient: n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>16</td>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>17</td>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>18</td>
<td>Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td>19</td>
<td>Explosive properties</td>
<td>Vapours can form explosive mixtures with air.</td>
</tr>
<tr>
<td>20</td>
<td>Oxidizing properties</td>
<td>None Vapour pressure: 59 mm Hg at 20°C</td>
</tr>
</tbody>
</table>

9.2 Other safety information

No data available

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 **Possibility of hazardous reactions**
No data available

10.4 **Conditions to avoid**
Heat, flames and sparks.

10.5 **Incompatible materials**
Alkali metals, Oxidizing agents, Peroxides.

10.6 **Hazardous decomposition products**
Other decomposition products - No data available

In the event of fire: see section 5

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**SECTION 11: TOXICOLOGICAL INFORMATION**

11.1 **Information on toxicological effects**

**Acute toxicity**
No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**

IARC: No component 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

**Additional Information**

RTECS: Not available
Central nervous system depression, narcosis, Damage to the heart. Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and
kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson’s disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis.

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence (Copper).

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

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
Toxic to aquatic life.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number
ADR/RID: 1170  IMDG: 1170  IATA: 1170
14.2 UN proper shipping name
ADR/RID: ETHANOL
IMDG: ETHANOL
IATA: Ethanol

14.3 Transport hazard class(es)
ADR/RID: 3
IMDG: 3
IATA: 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 precaution for user
No data available

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

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.

H225 Highly flammable liquid and vapour.
H228 Flammable solid.
H319 Causes serious eye irritation.
H400 Very toxic to aquatic life.
H412 Harmful to aquatic life with long lasting effects.

Disclaimer: ACS Material, LLC believes that the information in this Safety Data Sheet is accurate and represents the best and most current information available to us. ACS Material makes no representations or warranties either express or implied, regarding the suitability of the material for any purpose or the accuracy of the information contained within this document. Accordingly, ACS Material will not be responsible for damages resulting from use of or reliance upon this information.