1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Copper Nanowires A40, Research Grade
Catalog Number: NovaWire-Cu-A40-RD
Formula: Cu
Diameter: ~ 40 nm
Length: ~ 50 μm

Supplier: Novarials Corporation
52 Dragon Court, Suite 2B
Woburn, MA 01801
Telephone: +1 617-276-5642
Fax: +1 781-995-0388

2. HAZARDS IDENTIFICATION

Emergency Overview

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Flammable solids (Category 1), H228
Eye irritation (Category 2A), H319
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapor.
H228 Flammable solid.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTER or doctor/physician if you feel unwell.
P313 If eye irritation persists: Get medical advice/attention.
P337 + P313 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P391 Collect spillage.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
P501 Dispose of contents/container to an approved waste disposal plant.

**NFPA Ratings**
- Health Hazard: 2
- Fire Hazard: 3
- Reactivity Hazard: 3

**HMIS Ratings**
- Health Hazard: 2
- Chronic Health Hazard: *
- Flammability: 3
- Physical Hazard: 3

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
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<tbody>
<tr>
<td><strong>Copper</strong></td>
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<tr>
<td>CAS-No.</td>
<td>7440-50-8</td>
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<tr>
<td>EC-No.</td>
<td>231-159-6</td>
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<tr>
<td><strong>2-Propanol</strong></td>
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<tr>
<td>CAS-No.</td>
<td>67-63-0</td>
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<td>EC-No.</td>
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<td>Index-No.</td>
<td>603-117-00-0</td>
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Synonyms: Copper
Formula: Cu
Molecular Weight: 63.55 g/mol
4. FIRST AID MEASURES

**General advice**
Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance.

**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 and consult a physician.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

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

**Special protective equipment for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions – Copper Oxide, Carbon Oxides

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

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

**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. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Avoid inhalation of vapor or mist. Ensure adequate ventilation. Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the buildup of electrostatic charge.

**Conditions for safe storage**
Keep container tightly closed in a cool, dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Air sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type AXBEK (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 standards such as NIOSH (US) or CEN (EU).

Hand 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.

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).

Body protection
Impervious clothing. 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.

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.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>APPEARANCE</th>
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<tbody>
<tr>
<td>Form</td>
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<tr>
<td>Evaporation rate</td>
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</tbody>
</table>

10. STABILITY AND REACTIVITY
Reactivity
no data available

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapors may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Oxidizing agents, Acid anhydrides, Aluminium, Halogenated compounds, Acids, Acid chlorides, Halogens.

Hazardous decomposition products
Other decomposition products -no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity
no data available

Skin corrosion/irritation
May irritate skin.

Serious eye damage/eye irritation
May irritate eyes.

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC:  3 - Group 3: Not classifiable as to its carcinogenicity to humans (2-Propanol)
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity -single exposure (Globally Harmonized System)
May cause respiratory irritation. May cause drowsiness or dizziness.

Specific target organ toxicity -repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Additional Information
RTECS: NT8050000

Central nervous system depression, prolonged or repeated exposure can cause: Nausea, Headache, Vomiting, narcosis, Drowsiness. Overexposure may cause mild, reversible liver effects.
Kidney - Irregularities - Based on Human Evidence
Kidney - Irregularities - Based on Human Evidence

Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, center 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. Damage to the lungs, Vomiting, Diarrhoea, Abdominal pain, Blood disorders.

Liver – Irregularities – Based on Human Evidence.

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish
Mortality LOEC – Oncorhynchus mykiss (rainbow trout) – 0.022 mg/L – 96h

Toxicity to daphnia and other aquatic invertebrates
Mortality NOEC – Daphnia – 0.004 mg/L – 24h

EC50 – Daphnia magna (Water flea) – 0.04 – 0.05 mg/L – 48h

Persistence and degradability
no data available

Bioaccumulative potential
Bioaccumulation Cyprinus carpio (Carp) – 40 d – 200 mg/L
Bioconcentration factor (BCF): 108

Mobility in soil
no data available

PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects. Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

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

Contaminated packaging
Dispose of as unused product

14. TRANSPORT INFORMATION
DOT (US)
UN1219  Class: 3  Packing group: II
Proper shipping name: Isopropanol solution
Reportable Quantity (RQ):
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN1219  Class: 3  Packing group: II  EMS-No: F-E, S-D
Proper shipping name: Isopropanol solution
Marine pollutant: No

IATA
UN1219  Class: 3  Packing group: II
Proper shipping name: Isopropanol solution

15. REGULATORY INFORMATION

SARA 302 Components
Not required

SARA 313 Components
Copper  CAS-No. 7440-50-8
2-Propanol  CAS-No. 67-63-0

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard.

Massachusetts Right To Know Components
Copper  CAS-No. 7440-50-8
2-Propanol  CAS-No. 67-63-0

Pennsylvania Right To Know Components
Copper  CAS-No. 7440-50-8
2-Propanol  CAS-No. 67-63-0

New Jersey Right To Know Components
Copper  CAS-No. 7440-50-8
2-Propanol  CAS-No. 67-63-0

California Prop. 65 Components
This product does not contain any chemical known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. DISCLAIMER
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