Safety Data Sheet

CIRCUITWORKS® CONDUCTIVE EPOXY - Part A (Epoxy)

1. Product and company identification

<table>
<thead>
<tr>
<th>Product name</th>
<th>CONDUCTIVE SILVER EPOXY - Part A (Epoxy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier</td>
<td>Ladd Research</td>
</tr>
<tr>
<td></td>
<td>83 Holly Court</td>
</tr>
<tr>
<td></td>
<td>Williston, VT 05495</td>
</tr>
<tr>
<td>Tel.</td>
<td>802-658-4961</td>
</tr>
<tr>
<td>Synonym</td>
<td>adhesive</td>
</tr>
<tr>
<td>Trade name</td>
<td>CIRCUITWORKS® CONDUCTIVE EPOXY - Part A (Epoxy)</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Chemtronics</td>
</tr>
<tr>
<td></td>
<td>8125 Cobb Center Drive</td>
</tr>
<tr>
<td></td>
<td>Kennesaw, GA 30152</td>
</tr>
<tr>
<td>Tel.</td>
<td>770-424-4888 or toll free 800-645-5244</td>
</tr>
<tr>
<td>Code</td>
<td>60802, 60792</td>
</tr>
<tr>
<td>Preparation date</td>
<td>04/15/2020</td>
</tr>
<tr>
<td>In case of emergency</td>
<td>Chemtrec - 1-800-424-9300 or collect 703-527-3887 (24/7/365)</td>
</tr>
<tr>
<td>Product type</td>
<td>Solid.</td>
</tr>
</tbody>
</table>

2. Hazards identification

Emergency overview

Physical state    : Solid. [Paste.]
Color             : Gray. [Light]
Signal word       : WARNING!
Hazard statements : CAUSES EYE AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY CAUSE SKIN IRRITATION. CONTAINS MATERIAL THAT CAN CAUSE TARGET ORGAN DAMAGE.
Precautionary measures : Do not eat, drink or smoke when using this product. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.
OSHA/HCS status   : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential acute health effects

Inhalation : No known significant effects or critical hazards.
Ingestion  : Silver ingestion may result in generalized argyria.
Skin       : Severely irritating to the skin. May cause sensitization by skin contact.
Eyes       : Severely irritating to eyes. Risk of serious damage to eyes.

Potential chronic health effects

Chronic effects   : Contains material that can cause target organ damage.
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.
Fertility effects : No known significant effects or critical hazards.
2. Hazards identification

Target organs: Contains material which causes damage to the following organs: eye, lens or cornea. Contains material which may cause damage to the following organs: mucous membranes, upper respiratory tract, skin, nose/sinuses, testes.

Over-exposure signs/symptoms

Inhalation: No specific data.
Ingestion: Adverse symptoms may include the following: generalized argyria.
Skin: Adverse symptoms may include the following: irritation, redness.
Eyes: Adverse symptoms may include the following: pain or irritation, watering, redness.

Medical conditions aggravated by over-exposure: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

See toxicological information (Section 11)

3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>silver reaction product: bisphenol-A-(epichlorhydrin); epoxy resin</td>
<td>7440-22-4</td>
<td>60 - 90</td>
</tr>
<tr>
<td></td>
<td>25068-38-6</td>
<td>10 - 25</td>
</tr>
</tbody>
</table>

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.

4. First aid measures

Eye contact: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion: Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders: No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Notes to physician: No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
### 5. Fire-fighting measures

**Flammability of the product:** No specific fire or explosion hazard.

**Extinguishing media**

- **Suitable:** Use an extinguishing agent suitable for the surrounding fire.
- **Not suitable:** None known.

**Special exposure hazards:** 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.

**Hazardous thermal decomposition products:** Decomposition products may include the following materials:
- Carbon dioxide
- Carbon monoxide
- Halogenated compounds
- Metal oxide/oxides

**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.

### 6. Accidental release measures

**Personal precautions:** No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

**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).

**Methods for cleaning up**

- **Small spill:** Move containers from spill area. Avoid dust generation. Do not dry sweep. Place spilled material in a designated, labeled waste container. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, 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. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

### 7. Handling and storage

**Handling:** Put on appropriate personal protective equipment (see Section 8). 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. Do not ingest. Avoid contact with eyes, skin and clothing. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

**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.
8. Exposure controls/personal protection

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Exposure limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>silver</td>
<td>ACGIH TLV (United States, 3/2012). TWA: 0.1 mg/m³ 8 hours. Form: Dust and fumes</td>
</tr>
<tr>
<td></td>
<td>NIOSH REL (United States, 1/2013). Notes: as Ag TWA: 0.01 mg/m³, (as Ag) 10 hours. Form: METAL DUST AND SOLUBLE</td>
</tr>
<tr>
<td></td>
<td>OSHA PEL (United States, 6/2010). Notes: as Ag TWA: 0.01 mg/m³, (as Ag) 8 hours.</td>
</tr>
<tr>
<td></td>
<td>OSHA PEL 1989 (United States, 3/1989). Notes: as Ag TWA: 0.01 mg/m³, (as Ag) 8 hours.</td>
</tr>
</tbody>
</table>

**Recommended monitoring procedures**: If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

**Engineering measures**: Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

**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.

**Personal protection**

**Respiratory**: 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.

**Hands**: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Eyes**: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

**Skin**: 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.

**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.
9. Physical and chemical properties

Physical state: Solid. [Paste.]
Flash point: Closed cup: >93.3°C (>200°F) [Setaflash.]
Color: Gray. [Light]
Boiling/condensation point: >93.33°C (>200°F)
Vapor pressure: < 0.13 kPa (<1 mm Hg) [room temperature]
Vapor density: >1 [Air = 1]
Volatile: < 0.5% (w/w)
Evaporation rate: <1 (butyl acetate = 1)
Dispersibility properties: Not dispersible in the following materials: cold water, hot water, methanol, diethyl ether, n-octanol and acetone.

10. Stability and reactivity

Chemical stability: The product is stable.
Conditions to avoid: Excessive Heat.
Incompatible materials: Reactive or incompatible with the following materials: oxidizing materials acids alkalis Amines. Mercaptans.
Hazardous decomposition products: Under normal conditions of storage and use, hazardous decomposition products should not be produced. Carbon dioxide, carbon monoxide, halogenated compounds, metal oxide/oxides
Possibility of hazardous reactions: Under normal conditions of storage and use, hazardous reactions will not occur.

11. Toxicological information

Acute toxicity
Conclusion/Summary: Not available.

Chronic toxicity
Conclusion/Summary: Not available.

Irritation/Corrosion

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Score</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>reaction product: bisphenol-A-(epichlorhydrin); epoxy resin</td>
<td>Eyes - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>100 milligrams</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Skin - Moderate irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 500 microliters</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Skin - Severe irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 2 milligrams</td>
<td>-</td>
</tr>
</tbody>
</table>

Conclusion/Summary: Not available.

Sensitizer
Conclusion/Summary: Not available.

Carcinogenicity
Conclusion/Summary: Not available.

Classification

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>OSHA</th>
<th>IARC</th>
<th>NTP</th>
<th>ACGIH</th>
<th>EPA</th>
<th>NIOSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>silver</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None.</td>
</tr>
</tbody>
</table>

Mutagenicity
Conclusion/Summary: Not available.
11. Toxicological information

Teratogenicity
Conclusion/Summary : Not available.

Reproductive toxicity
Conclusion/Summary : Not available.

12. Ecological information

Ecotoxicity : No known significant effects or critical hazards.

Aquatic ecotoxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>silver</td>
<td>Acute EC50 1.4 μg/l Marine water</td>
<td>Algae - Chroomonas sp.</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>Acute EC50 0.24 μg/l Fresh water</td>
<td>Daphnia - Daphnia magna</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 4500 ppb Fresh water</td>
<td>Crustaceans - Gammarus pseudolimnaeus</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 2.13 to 2.93 μg/l Fresh water</td>
<td>Fish - Pimephales promelas</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 5 mg/l Marine water</td>
<td>Algae - Glenodinium halli</td>
<td>72 hours</td>
</tr>
</tbody>
</table>

Conclusion/Summary : Not available.

Persistence/degradability
Conclusion/Summary : Not available.

13. Disposal considerations

Waste disposal : 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. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

<table>
<thead>
<tr>
<th>Regulatory information</th>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Classes</th>
<th>PG*</th>
<th>Label</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT Classification</td>
<td>Not regulated.</td>
<td>Adhesive, sealants</td>
<td>-</td>
<td>-</td>
<td></td>
<td>Reportable quantity 1333.3 lbs / 605.33 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.</td>
</tr>
</tbody>
</table>
14. Transport information

<table>
<thead>
<tr>
<th>Classification</th>
<th>Not regulated.</th>
<th>Adhesive, sealants</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDG Classification</td>
<td>Not regulated.</td>
<td>Adhesive, sealants</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mexico Classification</td>
<td>Not regulated.</td>
<td>Adhesive, sealants</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ADR/RID Class</td>
<td>Not regulated.</td>
<td>Adhesives Sealants</td>
<td>-</td>
<td>-</td>
<td>Not regulated.</td>
</tr>
<tr>
<td>IMDG Class</td>
<td>Not regulated.</td>
<td>Adhesives Sealants</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IATA-DGR Class</td>
<td>Not regulated.</td>
<td>Adhesives Sealants</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

15. Regulatory information

**HCS Classification**: Irritating material
- Target organ effects

**U.S. Federal regulations**
- **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined
- **Clean Water Act (CWA) 307**: silver
- **Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)**: Not listed
- **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**
  - Immediate (acute) health hazard
  - Delayed (chronic) health hazard

**Composition/information on ingredients**

<table>
<thead>
<tr>
<th>Name</th>
<th>%</th>
<th>Fire hazard</th>
<th>Sudden release of pressure</th>
<th>Reactive</th>
<th>Immediate (acute) health hazard</th>
<th>Delayed (chronic) health hazard</th>
</tr>
</thead>
</table>

**SARA 313**
15. Regulatory information

<table>
<thead>
<tr>
<th>Product name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form R - Reporting requirements</td>
<td>silver</td>
<td>7440-22-4</td>
</tr>
<tr>
<td>Supplier notification</td>
<td>silver</td>
<td>7440-22-4</td>
</tr>
</tbody>
</table>

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

State regulations

Massachusetts: The following components are listed: SILVER
New York: The following components are listed: Silver
New Jersey: The following components are listed: SILVER
Pennsylvania: The following components are listed: SILVER
Canada inventory: All components are listed or exempted.

International regulations

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

16. Other information

Label requirements: CAUSES EYE AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY CAUSE SKIN IRRITATION. CONTAINS MATERIAL THAT CAN CAUSE TARGET ORGAN DAMAGE.

Hazardous Material Information System (U.S.A.)

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)
16. Other information

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Date of issue 04/15/2020

Indicates information that has changed from previously issued version.

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