Safety Data Sheet
29 CFR 1910.1200

Section 1: Company and Product Identification

Product Name: Dichloro (1,5-cyclooctadiene) Ruthenium (II)

Product Code: 8035

Company: Colonial Metals, Inc.
Building 20
505 Blue Ball Road
Elkton, MD 21921 United States
Company Contact: EHS Director
Telephone Number: 410-398-7200
FAX Number: 410-398-2918
E-Mail: info@colonialmetals.com
Web Site: www.colonialmetals.com

Emergency Supplier Emergency Contacts & Phone Number
Response: Chemtrec: 800-424-9300
World Wide - Call COLLECT to U.S: 703-527-3887

Section 2: Hazards Identification

Hazard Pictograms:

Signal Word: Warning

Hazard Category: Acute tox, oral Cat 5
Skin corrosion/irritation Cat 3
Serious eye damage/eye irritation Cat 3
Hazard to aquatic environment, chronic Cat 3

Hazard Statements:
H303: May be harmful if swallowed
H316: Causes mild skin irritation
H320: Causes eye irritation
H412: Harmful to aquatic life with long lasting effects

Precautionary Statements:
P260: Do not breathe dust/fume/gas/mist/vapors/spray
P264: Wash thoroughly after handling
P270: Do not eat, drink or smoke when using this product
P273: Avoid release to the environment
P272: Contaminated work clothing should not be allowed out of the workplace
P280: Wear protective gloves/protective clothing/eye protection/face protection
P501: Dispose of contents/container in accordance with local/regional/national/international rules.

Hazard to aquatic environment, chronic Cat 3
Hazardous substance (name): Dichloro (1,5-cyclooctadiene) Ruthenium (II)
Chemical Formula: C8H12C12Ru

Section 3: Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Hazardous substance (name)</th>
<th>Hazard Category</th>
<th>CAS#</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichloro (1,5-cyclooctadiene) Ruthenium (II)</td>
<td>Irritant</td>
<td>50982-13-3</td>
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</tbody>
</table>

Product Name: Dichloro (1,5-cyclooctadiene) Ruthenium (II)

Chemical Formula: C8H12C12Ru
Section 4: First Aid Measures

General Info: Consult a Physician. Show this safety data sheet to the doctor in attendance.

Notable Exposure symptoms:
If ingested: Rinse mouth. Seek immediate medical attention. Clear the airway and administer artificial respiration if not breathing.
If swallowed, do not induce vomiting unless directed to do so by medical personnel.

If inhaled: Remove the victim from the contaminated area while protecting yourself from exposure by wearing an appropriate respirator. Put a similar respirator on the victim if possible. Get medical attention immediately.

Eye contact: Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses if present and easy to do.

Skin contact: Flush area for 15 minutes with water and wash with soap and water. Remove contaminated clothing and shoes and wash before reuse.

Section 5: Fire Fighting Measures

General Info: Use NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.

Method / Equipment: Use extinguishing media appropriate for surrounding fire conditions. Quench with large quantities of water. Use water spray to cool fire exposed containers.

Hazardous Decomposition Info: Carbon oxides, Hydrogen chloride gas, Ruthenium oxide

Section 6: Accidental Release Measures

Personal precautions, protective equipment and procedures: Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate respiratory protective equipment and clothing during clean-up. Avoid breathing dust. Ventilate area if easy to do so. Contact local authorities if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Containment Large Spills: Contain actively spilling material if safe and easy to do so. Do not let product enter drains. Sweep up and placed in a proper vessel for recovery or disposal. Avoid raising dust.

Procedures: Ventilate and wash spill site after cleanup is complete.

Small Spills: Sweep or soak up and place in sealed container. Taking care to avoid dusting.

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.

Section 7: Handling and Storage

Safe Handling Precautions: Do not handle until all safety precautions have been read and understood. Keep containers tightly closed. Ensure adequate ventilation. Avoid breathing dust/vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Wear appropriate personal protective equipment and wash thoroughly after handling. Keep away from ignition sources. Keep away from heat and direct sunlight.

Recommendations for Storage: Hygroscopic - Store in cool, dry area in a tightly closed product container away from sources of ignition or flame. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Incompatibilities: Organics, especially acetone and alcohol. Strong oxidizing agents

Section 8: Exposure Control / Personal Protection

General / Ventilation: Local Exhaust: Required in handling area

Engineering Controls: Mechanical: Desirable to insure concentration of material below TLV/TWA levels

Work Clothing: Protective work clothing which covers skin and prevents exposures.

Eye/face protection: Wear safety glasses with side shields or goggles or face shield.

Skin Protection: Wear chemical resistant gloves.
Respiratory Protection: NIOSH approved chemical cartridge respirator for particulates and dust or self-contained breathing apparatus with full face shield.

Additional Information: Observe good chemical hygiene practices. Do not smoke or eat while using this product. Wash hands or exposed skin after using the product.

Section 9: Physical and Chemical Properties

State: Solid  Melting Point: 205 °C (401 °F)  Freezing Point: N/A
Color: Brown Powder  Boiling Point/Range: N/A  pH: N/A
Molecular Wt.: 280.16 g/mol  Odor: N/A  Water Solubility: Insoluble
Specific Gravity: 6.97 g/cm³  Flash Point: N/A  Part. Coeff (n-octanol/water): N/A
Upper Flam Limits: N/A  Lower Flam Limits: N/A  Vapor Pressure: 0.00033 hPa (0.00025 mmHg) at 25 °C (77 °F)
Relative Density: 0.600 g/cm³  Viscosity: N/A  Autoignition Temp: N/A

Section 10: Stability and Reactivity

General: This product is stable and non-reactive under normal conditions of use. Product is not subject to hazardous polymerization. Avoid open flame and ignition sources.

Stability: Stable  Conditions to Avoid: Moisture
Incompatible materials: Organics, especially acetone and alcohol. Strong oxidizing agents
Decomposition products: Carbon oxides, Hydrogen chloride gas, Ruthenium oxide

Section 11: Toxicological Information

General Information: To the best of our knowledge the chemical, physical, and toxicological effects of this compound have not been thoroughly investigated.

Toxicological Information (product):
LD50 Oral - rat - > 2,000 mg/kg
Inhalation: no data available
Dermal: no data available

Skin corrosion/irritation:
Skin - rabbit
Result: No skin irritation

Serious eye damage/eye irritation:
Eyes - rabbit
Result: No eye irritation

Germ cell mutagenicity:
Result: This material has shown a positive Ames test, an in vitro test that indicates a possible potential to produce a carcinogenic effect.
Histidine reversion (Ames)

Likely Routes of Exposure:
Eye Contact
Skin Contact
Inhalation
Ingestion - possible, but considered unlikely.

Carcinogenicity or mutagenicity: To the best of our knowledge the chemical, physical, and toxicological effects of this compound have not been thoroughly investigated.
Sensitization: Product is not expected to be a sensitizer.
Other Notes: None
Section 12: Ecological Information

General information: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life with long lasting effects.

Aquatic toxicity: Toxicity to daphnia and other aquatic invertebrates, EC50 – Daphnia magna (Water flea) – 26 mg/l

Degradation / Mobility info: Persistence and degradability
Biodegradability. Result: - Not readily biodegradable

Bioaccumulative potential: Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

Section 13: Disposal Information

Product disposal: Place in a sealed container. Consult Federal EPA, State and local regulations for proper disposal/recycle/reclamation

NOTE: Chemical additions, processing, or otherwise altering this material may make the waste management information presented above incomplete, inaccurate, or otherwise inappropriate.

Container disposal: Treat empty containers with extra care. Consult waste contractor.

Other considerations: No further information.

Section 14: Transport Information

DOT: Proper Shipping Name: Non-Hazardous - Not dangerous goods

IMO/IMDG: Not dangerous goods

IATA: Not dangerous goods - Consult IATA before shipping

Comments: None

Section 15: Regulatory Information

TSCA: Not listed in the TSCA

SARA: SARA 302 Components:
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components:
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards:
No SARA Hazards

Right to Know Massachusetts Right To Know Components:
Components: No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components:
Ruthenium dichlor[1,2,5,6-\(\text{h}\)-1,5-cyclooctadien]-, homopolymer
CAS-No. 50982-13-3 Revision Date

New Jersey Right To Know Components:
Ruthenium dichlor[1,2,5,6-\(\text{h}\)-1,5-cyclooctadien]-, homopolymer
CAS-No. 50982-13-3 Revision Date

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

Other International: None

Regulations:
### Section 16: Other Information

<table>
<thead>
<tr>
<th>NFPA Rating</th>
<th>HMIS Rating</th>
</tr>
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<tbody>
<tr>
<td>Health: 0</td>
<td>Health: 0</td>
</tr>
<tr>
<td>Fire: 0</td>
<td>Fire: 0</td>
</tr>
<tr>
<td>Reactivity: 0</td>
<td>Reactivity: 0</td>
</tr>
<tr>
<td>Personal Protection: C</td>
<td></td>
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</tbody>
</table>

**Disclaimer:** In compliance with the OSHA Hazard communication Standard, 29 C.F.R 1910.1200, we are providing you with a Materials Safety Data Sheet (MSDS) for the hazardous material you are purchasing.

It is your responsibility to educate your employees on the safe use of the hazardous material. With this in mind, a copy should be forwarded to the supervisor of the user or to the user themselves, and copy should be retained in your files for future reference.

Colonial Metals, Inc. makes no presentation as to the accuracy of the information in the MSDS. The information is believe to be correct; however, you (the customer), should preform your own investigation and independent verification.

If you resell the product, you are responsible to forward the information in the MSDS to your customer.

Colonial Metals, Inc.

<table>
<thead>
<tr>
<th>SDS Author:</th>
<th>Version Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Kerchner</td>
<td>7/30/2015</td>
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