Section 1 - Product and Company Information

Product Name: Ruthenium(IIl) chloride hydrate
Product Number: 206229
Brand: Aldrich Chemical
Company: Sigma-Aldrich
Street Address: 3050 Spruce Street
City, State, Zip, Country: SAINT LOUIS, MO 63103 US
Technical Phone: 314 771 5765
Fax: 800 326 5052
Emergency Phone: 414 273 3850 Ext. 5996

Section 2 - Composition/Information on Ingredient

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>CAS #</th>
<th>SARA 313</th>
<th>EC no</th>
<th>Annex I Index Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUTHENIUM(IIl) CHLORIDE HYDRATE</td>
<td>14898-67-0</td>
<td>No</td>
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</table>

Formula: RuCl3.xH2O
Synonyms:

Section 3 - Hazards Identification

Emergency Overview
Corrosive. Causes burns.

HMIS Rating
Health: 3 Flammability: 0 Reactivity: 1

NFPA Rating
Health: 3 Flammability: 0 Reactivity: 1

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

Oral Exposure
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately. Do not induce vomiting.

Inhalation Exposure
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Dermal Exposure
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

Eye Exposure
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

Autoignition Temp: N/A
Extinguishing Media: Suitable
Dry chemical powder.

Firefighting
Protective Equipment
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s)
Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill
Evacuate area.

Procedure(s) of Personal Precaution(s)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up
Sweep up, place in a bag and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling
User Exposure
Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

Storage
Suitable
Keep tightly closed.

Special Requirements
Hygroscopic.

Section 8 - Exposure Controls / PPE

Engineering Controls
Safety shower and eye bath. Use only in a chemical fume hood.

Personal Protective Equipment
Respiratory
Government approved respirator.
Hand
Compatible chemical-resistant gloves.
Eye
Chemical safety goggles.

Sigma-Aldrich Corporation
www.sigma-aldrich.com
General Hygiene Measures
Wash contaminated clothing before reuse. Discard contaminated shoes. Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Physical State</th>
<th>Color</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid</td>
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<td>Deep grey</td>
<td>Powder</td>
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</table>

Molecular Weight: 207.43 AMU

<table>
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<tr>
<th>Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>pH</td>
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<tr>
<td>BP/BP Range</td>
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<tr>
<td>MP/MP Range</td>
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<tr>
<td>Freezing Point</td>
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<tr>
<td>Vapor Pressure</td>
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<td>Saturated Vapor Conc.</td>
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<td>SG/Density</td>
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<tr>
<td>Bulk Density</td>
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<td>Odor Threshold</td>
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<td>Volatile%</td>
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<tr>
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<tr>
<td>Water Content</td>
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<tr>
<td>Solvent Content</td>
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<tr>
<td>Evaporation Rate</td>
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<tr>
<td>Viscosity</td>
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<tr>
<td>Partition Coefficient</td>
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<tr>
<td>Decomposition Temp.</td>
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<tr>
<td>Flash Point &quot;P&quot;</td>
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<tr>
<td>Flash Point &quot;Q&quot;</td>
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<tr>
<td>Explosion Limits</td>
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<td>Flammability</td>
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<tr>
<td>Autoignition Temp</td>
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<tr>
<td>Solubility</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N/A = not available

Section 10 - Stability and Reactivity

Stability
Stable

Materials to Avoid
Zinc

Hazardous Decomposition Products
Hydrogen chloride gas.

Section 11 - Toxicological Information

Hazardous Polymerization
Will not occur.

Route of Exposure
Skin Contact
Causes burns.
Skin Absorption
May be harmful if absorbed through the skin.
Eye Contact
Causes burns.
Inhalation
Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. May be harmful if inhaled.
Ingestion
May be harmful if swallowed.

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynx, bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

RTECS Number: N/A

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation
Contact a licensed professional waste disposal service to dispose of this material.

Safely wash any contaminated equipment and culture vessels. Dispose of waste water and sludges in accord with appropriate regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Corrosive solid, acidic, inorganic, n.o.s.
UN No.: 3260
Class: 8
Packing Group: Packing Group II
Hazard Label: Corrosive
PIR: NCIPIR

IATA
Proper Shipping Name: Corrosive solid, acidic, inorganic, n.o.s.
IATA UN Number: 3260
Hazard Class: 8
Packing Group: II
Section 15 - Regulatory Information

EU Additional Classification
Symbol of Danger: C
Indication of Danger
Corrosive.
Risk Statements
R: 34
Causes burns.
Safety Statements
S: 26 36/37/39 45
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eyewash protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US Classification and Label Text
Indication of Danger
Corrosive.
Risk Statements
Causes burns.
Safety Statements
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eyewash protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

United States Regulatory Information
SARA Listed: No

Canada Regulatory Information
WHMIS Classification
This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: No
NDSL: No

Section 16 - Other Information

Disclaimer
For R&D use only. Not for drug, household or other uses.

Warranty
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc. shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2004 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.