1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Identifier
Product Name/Catalog ID 82026-046, 89800-134

Other means of identification
Product Description 1000 µg/mL Ruthenium

Recommended use of the chemical and restrictions on use
Recommended Use Laboratory chemicals.
Uses advised against No information available

Details of the supplier of the safety data sheet
Company VWR International, LLC
Radnor Corporate Center
Building One, Suite 200
P.O. Box 6660
100 Matsonford Road
Radnor, PA 19087-8660
Tel: 610-386-1700

Emergency Telephone Number
Chemtrec 1-800-424-9300 (US)
Canutec - 1-613-996-6666 (Canada)

2. HAZARDS IDENTIFICATION

GHS
Classification
Skin corrosion/irritation Category 2

Label Elements

Warning
Hazard Statements
Causes skin irritation
Precautionary Statements - Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection

Precautionary Statements - Response
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse

Hazards not otherwise classified (HNOC)

Other Information

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>7647-01-0</td>
<td>10</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

First Aid Measures

General Advice
Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Eye Contact
Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. Do not rub affected area. Immediate medical attention is required.

Skin Contact
Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Immediate medical attention is required.

Inhalation
Move to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Call a physician or Poison Control Center immediately. If breathing is difficult, give oxygen. If breathing is irregular or stopped, administer artificial respiration. Immediate medical attention is required.

Ingestion
Do NOT induce vomiting. Clean mouth with water and afterwards drink plenty of water. Never give anything by mouth to an unconscious person. Immediate medical attention is required.

Protection of First-aiders
Use personal protective equipment. Avoid contact with skin, eyes and clothing.

Most important symptoms and effects, both acute and delayed

Most Important Symptoms/Effects
Difficulty breathing. Burn.
Indication of any immediate medical attention and special treatment needed

Notes to Physician  Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media  Decomposition by contact with water may generate vapors which can be ignited by heat or open flame.

Special Exposure Hazards Arising from the Substance/Mixture
Thermal decomposition can lead to release of irritating and toxic gases and vapors. The product causes burns of eyes, skin and mucous membranes.

Explosion Data
Sensitivity to Mechanical Impact  None.
Sensitivity to Static Discharge  None.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions  Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Use personal protective equipment. Do not get in eyes, on skin, or on clothing.

Other Information  Refer to protective measures listed in Sections 7 and 8.

Environmental Precautions

Environmental Precautions  Prevent further leakage or spillage if safe to do so. Do not flush into surface water or sanitary sewer system. Prevent product from entering drains. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

Methods and material for containment and cleaning up

Methods for Cleaning up  Dam up. Neutralise with lime; soda. Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Precautions for Safe Handling

Handling  Wear personal protective equipment. Ensure adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. Do not get in eyes, on skin, or on clothing. Do not breathe vapors or spray mist.

Conditions for safe storage, including any incompatibilities

Technical measures/Precautions  Keep containers tightly closed in a dry, cool and well-ventilated place.

Incompatible Products  None known based on information supplied.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
Exposure Guidelines

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>Ceiling: 2 ppm</td>
<td>(vacated) Ceiling: 5 ppm</td>
<td>IDLH: 50 ppm</td>
</tr>
<tr>
<td>7647-01-0</td>
<td></td>
<td>Ceiling: 7 mg/m³</td>
<td>Ceiling: 5 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ceiling: 7 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Appropriate engineering controls

Engineering Measures

Ensure adequate ventilation, especially in confined areas.

Individual protection measures, such as personal protective equipment

Eye Protection
Tightly fitting safety goggles
Face-shield

Skin and Body Protection
Long sleeved clothing
Boots
Impervious clothing
Chemical resistant apron

Hand Protection
Impervious gloves

Respiratory Protection
When workers are facing concentrations above the exposure limit they must use
appropriate certified respirators
If exposure limits are exceeded or irritation is experienced,
NIOSH/MSHA approved respiratory protection should be worn

Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.
Wear suitable
gloves and eye/face protection.
Avoid contact with skin, eyes and clothing.
Do not eat, drink
or smoke when using this product.
Wash hands before breaks and immediately after
handling the product.
Remove and wash contaminated clothing before re-use.
Contaminated work clothing should not be allowed out of the workplace.
Provide regular
cleaning of equipment, work area and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Clear / Amber</td>
</tr>
<tr>
<td>Odor</td>
<td>Slight chlorine</td>
</tr>
<tr>
<td>pH VALUE</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting Point/Range</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling Point/Range</td>
<td>100 °C</td>
</tr>
<tr>
<td>Flash Point</td>
<td>No data available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative Density</td>
<td>No data available</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>No data available</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Miscible</td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>No data available</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive Properties</td>
<td>No information available</td>
</tr>
<tr>
<td>Oxidizing Properties</td>
<td>No information available</td>
</tr>
<tr>
<td>Other information</td>
<td></td>
</tr>
<tr>
<td>VOC Content</td>
<td>No information available</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Reactivity
No data available.
Chemical Stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous Polymerization
Hazardous polymerization does not occur.

Conditions to Avoid
Extremes of temperature and direct sunlight.

Incompatible Materials
Reducing agents

Hazardous Decomposition Products
Hydrogen chloride.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information
Irritating to eyes, irritating to respiratory system, irritating to skin.

Inhalation
Vapors may be irritating to eyes, nose, throat, and lungs.

Eye Contact
Irritating to eyes.

Skin Contact
Irritating to skin.

Ingestion
Ingestion may cause irritation to mucous membranes.

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid 7647-01-0 (10)</td>
<td>700 mg/kg (Rat)</td>
<td>&gt; 5010 mg/kg (Rabbit)</td>
<td>= 3124 ppm (Rat) 1 h</td>
</tr>
</tbody>
</table>

Information on toxicological effects

Symptoms
No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization
No information available.

Mutagenic Effects
No information available.

Carcinogenic effects
No information available.

Reproductive Toxicity
No information available.

STOT - single exposure
No information available.

STOT - repeated exposure
No information available.

Target Organ Effects
Eyes, Respiratory system, Skin.

Aspiration Hazard
No information available.

Numerical measures of toxicity - Product Information

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral) 7000 mg/kg
ATEmix (dermal) 50150 mg/kg
ATEmix (inhalation-dust/mist) 5 mg/L
ATEmix (inhalation-vapor) 30 mg/L

12. ECOLOGICAL INFORMATION
Ecotoxicity

Ecotoxicity effects

0.35% of the mixture consists of components(s) of unknown hazards to the aquatic environment

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Toxicity to Algae</th>
<th>Toxicity to Fish</th>
<th>Microtox</th>
<th>Daphnia Magna (Water Flea)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid 7647-01-0</td>
<td></td>
<td>282: 96 h Gambusia affinis mg/L LC50 static</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Persistence and Degradability

No information available.

Bioaccumulation/Accumulation

No information available.

Other Adverse Effects

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from Residues/Unused Products
Dispose of in accordance with federal, state and local regulations

Contaminated Packaging
Do not re-use empty containers.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>California Hazardous Waste Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid 7647-01-0</td>
<td>Toxic Corrosive Reactive</td>
</tr>
</tbody>
</table>

14. TRANSPORT INFORMATION

IMDG/IMO

14.1. UN-No
UN3264

14.2. Proper Shipping Name
Corrosive liquid, acidic, inorganic, n.o.s

14.3. Hazard Class
8

14.4. Packing Group
III

14.5. Marine Pollutant
Not applicable.

None

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
No information available.

RID

14.1. UN-No
UN3264

14.2. Proper Shipping Name
Corrosive liquid, acidic, inorganic, n.o.s

14.3. Hazard Class
8

14.4. Packing Group
III

14.5. Environmental hazard
Not applicable.

None

ADR

14.1. UN-No
UN3264

14.2. Proper Shipping Name
Corrosive liquid, acidic, inorganic, n.o.s

14.3. Hazard Class
8

14.4. Packing Group
III
14.1. UN-No  UN3264
14.2. Proper Shipping Name  Corrosive liquid, acidic, inorganic, n.o.s
14.3. Hazard Class  8
14.4. Packing Group  III
14.5. Environmental hazard  None
14.6. Special Provisions  None

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Complies</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSCA</td>
<td>Complies</td>
</tr>
<tr>
<td>DSL/NDSL</td>
<td>Complies</td>
</tr>
<tr>
<td>EINECS/ELINCS</td>
<td>Complies</td>
</tr>
<tr>
<td>ENCS</td>
<td>Complies</td>
</tr>
<tr>
<td>IECSC</td>
<td>Complies</td>
</tr>
<tr>
<td>KECL</td>
<td>Complies</td>
</tr>
<tr>
<td>PICCS</td>
<td>Complies</td>
</tr>
<tr>
<td>AICS</td>
<td>Complies</td>
</tr>
</tbody>
</table>

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid - 7647-01-0</td>
<td>7647-01-0</td>
<td>10</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories

- Acute Health Hazard: No
- Chronic Health Hazard: No
- Fire Hazard: No
- Sudden Release of Pressure Hazard: No
- Reactive Hazard: No

Clean Water Act
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)
CWA - Reportable Quantities
CWA - Toxic Pollutants
CWA - Priority Pollutants
CWA - Hazardous Substances

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazardous Substances RQs</th>
<th>Extremely Hazardous Substances RQs</th>
<th>RQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>5000 lb</td>
<td>5000 lb</td>
<td>RQ 5000 lb final RQ</td>
</tr>
<tr>
<td>7647-01-0</td>
<td></td>
<td></td>
<td>RQ 2270 kg final RQ</td>
</tr>
</tbody>
</table>

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7647-01-0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

U.S. EPA Label Information

16. OTHER INFORMATION

Revision Date
13-Aug-2015

Revision Note
No information available

Disclaimer
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. VWR International and its Affiliates shall not be held liable for any damage resulting from handling.

End of MSDS