

## RUTHENIUM - HCl

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### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY

#### 1.1 Product Identifier

|               |                 |
|---------------|-----------------|
| Product form  | Liquid          |
| Chemical Name | RUTHENIUM - HCl |
| Index No.     | Mixture         |
| EC No.        | Mixture         |
| CAS No.       | Mixture         |

#### 1.2 Relevant identified uses of the substance or mixture and uses advised against

|       |                          |                                      |
|-------|--------------------------|--------------------------------------|
| 1.2.1 | Relevant identified uses | Laboratory Chemical                  |
| 1.2.2 | Uses advised against     | No additional information available. |

#### 1.3 Details of the supplier of the safety data sheet

De Bruyn Spectroscopic Solutions  
70/145 Chattan Road  
Glenferness  
Midrand, 2191 Gauteng  
South Africa

#### 1.4 Emergency telephone number

RSA: 086 100 0366  
Namibia: 080 010 0366  
Other: Local Emergency Services.

### SECTION 2: HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

**Classification Regulation (EC) No 1272/2008 (CLP):**

Met cor. 1 H290  
Skin Irr. 2, H315  
Eye Irr 2A, H319  
STOT SE, 3, H335

Full text of hazard classes and H statements: see Section 16.

**Adverse physicochemical, human health and environmental effects:**

May be corrosive to metals. Causes skin irritation. Causes severe eye irritation. May cause respiratory irritation.

#### 2.2 Label Elements

**Labelling (Regulation (EC) No 1272/2008**

Hazard Pictograms:



Signal word: WARNING

Hazard Statements:

H290 – May be corrosive to metals.  
H315 – Causes skin irritation.  
H319 – Causes severe eye irritation.  
H335 – May cause respiratory irritation.

Precautionary Statements:

P261 - Do not breathe mist, vapour, fume, or spray.  
P271 – Use only outdoors or in a well-ventilated area.  
P264 - Wash hands, forearms, and face thoroughly after handling.  
P280 - Wear protective gloves/protective clothing/eye protection/face protection.

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P303+P361+P353 - IF ON SKIN (or hair): Immediately remove/take off all contaminated clothing. Rinse skin with water/shower.

P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do and continue rinsing.

P304+P340 – IF INHALED: remove to fresh air and keep at rest in a position suitable for breathing.

Components contributing to classification: Hydrochloric Acid,

Reduced Labelling (< = 125 ml)

Pictogram:



Signal Word: Warning

Hazard Statements:

Causes skin irritation and severe eye irritation.

May cause respiratory irritation.

Precautionary Statements: None

Supplemental Hazard Statements: none

### 2.3 Other hazards

**Other hazards not contributing to the classification:**

This substance/mixture contains no components considered to be either persistent, bio accumulative and toxic (PBT), or very persistent and very bio accumulative (vPvB) at levels of 0.1% or higher.

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substance

Not applicable.

### 3.2 Mixture

| Name               | Product Identifier  | %                        | Classification according to Regulation (EC) No. 1272/2008 [CLP]                         |
|--------------------|---|--------------------------|---|
| Hydrochloric acid  | (CAS-No.) 7647-01-1<br>(EC-No.) 231-595-7 (EC Index-No.) 017-002-00-2 | 10                       | Met cor 1, H290; Skin Corr. 1B, H314; Eye dam 1, H318; STOT SE 3, H335                  |
| Ruthenium chloride | (CAS No.)148-67-0<br>(EC No.) 604-667-4                               | 0.01 – 10000 µg/mL as Ru | Met cor, H290;Ac tox 4, H302; Skin Corr. 1B, H314; Eye dam 1, H318 ; Chr Aq tox 2, H411 |

Specific concentration limits: HCl  
(C ≥ 25%) Skin Corr. 1B, H314  
(10 ≤ C <25%) Skin Irr. 2, H315  
(10 ≤ C <25%) Eye irr. 2, H319  
(C ≥ 10%) STOT SE 3, H335

## SECTION 4: FIRST AID MEASURES

### 4.1 Description of First Aid Measures

**First aid measures general**

Call a physician if symptoms persist. First aiders need to protect themselves.

**First aid measures after inhalation**

Remove person to fresh air and keep comfortable for breathing.

**First aid measures after skin contact**

Rinse skin with water/shower. Take off immediately all contaminated clothing. Call a doctor if symptom persist.

**First aid measures after eye contact**

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a doctor/physician if symptoms persist.

**First aid measures after ingestion**

Rinse mouth. Do not induce vomiting. Call a doctor/physician if feeling uncomfortable.

### 4.2 Most important symptoms and effects, both acute and delayed

Symptoms/effects after inhalation

May cause respiratory irritation.

Symptoms/effects after skin contact

Causes skin irritation.

Symptoms/effects after eye contact

Causes severe eye irritation.

Symptoms/effects after ingestion

May cause throat and digestive system irritation.

**4.3 Indication of any immediate medical attention and special treatment needed:**

Treat symptomatically.

**SECTION 5: FIRE FIGHTING MEASURES**

**5.1 Extinguishing media**

Suitable extinguishing media

Water spray. Dry powder. Foam. Carbon dioxide. Use water fog to control fumes.

**5.2 Special hazards arising from the substance or mixture**

Fire hazard

Product not combustible.

Hazardous decomposition products in case of fire

Toxic fumes may be released. Hydrogen chloride gas, chlorine.

**5.3 Advice for firefighters**

Protection during firefighting

Do not attempt to act without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

**5.4 Further Information**

Suppress (knock down) gases/vapours/mists with a water fog. Cool closed containers exposed to fire with water spray.

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

**6.1 Personal precautions, protective equipment, and emergency procedures**

**6.1.1 For non-emergency personnel**

Emergency procedures

Avoid substance contact. Do not breathe mist, vapour, fume, or spray.

**6.1.2 For emergency responders**

Protective equipment

Do not attempt to act without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

**6.2 Environmental precautions**

Avoid release to the environment.

**6.3 Methods and materials for containment and cleaning up**

Methods for cleaning up

Cover spill area with inert material to avoid spread. Neutralise with lime or soda ash. Flush area.

Other Information

Dispose of materials or solid residues at an authorized site.

**6.4 Reference to other sections**

For further information refer to section 8, 13.

**SECTION 7: HANDLING AND STORAGE**

**7.1 Precautions for safe handling**

Precautions for safe handling

Wear recommended personal protective equipment. See section 8. Avoid contact with eyes and skin. Do not breathe mist, vapour, fume, or spray.

Hygiene measures:

Handle in accordance with good industrial hygiene and safety practice. Immediately change contaminated clothing. Wash hands before breaks and at the end of workday. Do not eat, drink, or smoke while working.

**7.2 Conditions for safe storage, including any incompatibilities**

Storage conditions

Store in a cool, dry, well-ventilated area. Keep out of direct sunlight and away from heat, water, and incompatible materials. Keep containers tightly closed.

Incompatible materials

Oxidizing agents, bases, metals, organic compounds. Corrosive to mild steel.

Packaging

Polyethylene, polypropylene, polyvinyl chloride.

**7.3 Specific end users**

No additional information.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Exposure Limits

| Hydrochloric Acid (CAS: 7647-01-1)               |                            |                             |
|--|----------------------------|-----------------------------|
| United Kingdom                                   | WEL STEL (Gas and mist)    | 5 ppm / 8 mg/m <sup>3</sup> |
|  | WEL TWA (Gas and mist)     | 1 ppm / 2 mg/m <sup>3</sup> |
| South Africa; HCA Regulations (Restricted Limit) | TWA (8Hour) (Gas and mist) | 4 ppm                       |

### 8.2 Exposure controls

#### Appropriate engineering controls

Ensure availability of eye wash and shower in work area. Engineering measures are preferred to reduce exposure

#### Personal protective equipment

##### Hand protection

Protective gloves PVC, rubber

##### Eye protection

Tightly fitting safety goggles/face mask

##### Skin and body protection

Acid resistant protective clothing,

##### Respiratory protection

In case of inadequate ventilation, use appropriate respiratory protection.



#### Environmental exposure controls

Avoid release to the environment.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

|  |                               |
|--|-------------------------------|
| Product form                                 | Liquid                        |
| Appearance                                   | Clear colourless              |
| Odour  | Pungent                       |
| Odour threshold                              | No data available             |
| pH   | <1 @ 20°C                     |
| Relative evaporation rate (butylacetat e= 1) | No data available             |
| Melting point/Freezing Point                 | -17°C                         |
| Initial Boiling point                        | 102°C (at 1.013 hPa)          |
| Flash point                                  | Not applicable                |
| Auto-ignition temperature                    | Not applicable                |
| Flammability (solid, gas)                    | Not applicable                |
| Vapour pressure                              | No data available             |
| Vapour density                               | No data available             |
| Relative vapour density @ 20°C               | No data available             |
| Density                                      | 1.05 g/cm <sup>3</sup> @ 20°C |
| Solubility (water)                           | Miscible                      |
| Log Pow                                      | No data available             |
| Viscosity, kinematic                         | No data available             |
| Viscosity, dynamic                           | No data available             |
| Explosive properties                         | Not classified as explosive   |
| Explosive limits                             | Not applicable                |
| Oxidising properties                         | None                          |

### 9.2 Additional information

No additional data available.

**SECTION 10: STABILITY AND REACTIVITY**

- 10.1 Reactivity**  
The product is non-reactive under recommended conditions of use, storage and transport.
- 10.2 Chemical stability**  
Stable under recommended storage conditions.
- 10.3 Possibility of hazardous reactions**  
The product reacts with metals with release of highly flammable hydrogen gas. Reacts with alkalis with evolution of heat. Reacts with oxidizers generating toxic chlorine gas. Reacts with cyanides or sulphides generating toxic hydrogen cyanide or hydrogen sulphide gas.
- 10.4 Conditions to avoid**  
Heat, direct sunlight, contact with common metals, alkali metals, incompatible products.
- 10.5 Incompatible materials**  
Bases, amines, alkali metals, metals, oxidizers.
- 10.6 Hazardous decomposition products**  
When heated to decomposition, emits hydrogen chloride gas and will react with water or steam to produce heat and toxic, corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.

**SECTION 11: TOXICOLOGICAL INFORMATION**

- 11.1 Information on toxicological effects:**
- |                              |  |
|------------------------------|--|
| Acute toxicity (oral)        | Product does not meet classification criteria. |
| Acute toxicity (Dermal)      | Product does not meet classification criteria. |
| Acute toxicity (Respiratory) | Product does not meet classification criteria. |

**Ruthenium chloride (CAS: 148-67-0)**

|                                   |                                   |
|-----------------------------------|-----------------------------------|
| LD50 (Orl)                        | 501 mg/kg                         |
| Skin corrosion/irritation:        | Causes skin irritation.           |
| Serious eye damage/irritation     | Causes severe eye irritation      |
| Respiratory or skin sensitisation | Not classified                    |
| Germ cell mutagenicity            | Not classified                    |
| Carcinogenicity                   | Not classified                    |
| Reproductive toxicity             | Not classified.                   |
|                                   | Not classified.                   |
| STOT-SE                           | May cause respiratory irritation. |
| STOT RE                           | Not classified                    |
| Aspiration hazard                 | Not classified                    |

- 11.2 Additional Information**  
**Endocrine disrupting properties**  
This substance/mixture contains components considered to have endocrine disrupting properties affecting human health, according to REACH Article 57(f), Commission Regulation (EU) 2018/605 or Commission Delegated Regulation (EU) 2017/2100: None

**SECTION 12: ECOLOGICAL INFORMATION**

- 12.1 Toxicity**
- |                          |   |
|--------------------------|---|
| Ecology - general        | Before neutralisation, the product may represent a danger to aquatic organisms. |
| Acute aquatic toxicity   | Product does not meet classification criteria.                                  |
| Chronic aquatic toxicity | Product does not meet classification criteria.                                  |

**Ruthenium chloride (CAS: 148-67-0)**

|                   |  |
|-------------------|--|
| Chr Aq Category 2 | Toxic to aquatic life with long lasting effects. |
|-------------------|--|

- 12.2 Persistence and degradability**  
Not applicable for inorganic compounds.
- 12.3 Bioaccumulative potential**  
Not applicable for inorganic compounds.
- 12.4 Mobility**  
Mobile.

**12.5 Results of PBT and vPvB assessment**

This substance/mixture contains no components considered to be either persistent, bio accumulative or toxic (PBT), or very persistent and very bio accumulative (vPvB) at levels of 0.1% or higher.

**12.6 Endocrine disrupting properties**

Assessment This substance/mixture contains components considered to have endocrine disrupting properties for environment, according to REACH Article 57(f), Commission Regulation (EU) 2018/605 or Commission Delegated Regulation (EU) 2017/2100: None

**12.7 Other adverse effects**


No additional information.

**SECTION 13: DISPOSAL CONSIDERATIONS****Waste treatment methods: Product and packaging**

The generation of waste should be avoided or minimised wherever possible. This material and packaging must be disposed of in a safe way in consultation with licensed waste disposal company in accordance with local legal requirements.

**SECTION 14: TRANSPORT INFORMATION**

In accordance with ADR / IMDG / IATA

|                         | ADR               | IMDG              | IATA              | Class diamond   |
|-------------------------|-------------------|-------------------|-------------------|---|
| UN Number               | 1789              | 1789              | 1789              |  |
| Proper Shipping Name    | HYDROCHLORIC ACID | HYDROCHLORIC ACID | HYDROCHLORIC ACID |   |
| Hazard Class            | 8                 | 8                 | 8                 |   |
| Subsidiary hazard class | -                 | -                 | -                 |   |
| Packing Group           | II                | II                | II                |   |
| Marine pollutant        | No                | No                | No                |   |

Limited/Excepted quantity: 1L

**SECTION 15: REGULATORY INFORMATION****15.1 Safety, health, and environmental regulations/legislation specific for the substance or mixture**

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

**Authorisations and/or restrictions on use:**

This product does not contain any substance listed on Annex XIV of the REACH Regulation (EC) Nr. 1907/2006. Regulation (EU) 2019/1148 on the marketing and use of explosives precursors: None

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII) : No restrictions.

**National Regulations:**

Occupational Health and Safety Act 85 of 1993.  
Hazardous Chemical Agents Regulations.  
SANS 10228, 10229, 10232-4.

**15.2 Chemical Safety Assessment**

No chemical safety assessment has been carried out.

**SECTION 16: OTHER INFORMATION**

Full text of R-, H- and EUH-statements:

|                       |  |
|-----------------------|--|
| Sk irr. Cat 2, H315   | Skin irritation, Category 2, Causes skin irritation                                    |
| Eye irr. Cat 2A, H319 | Eye irritation, Category 2A, Causes severe eye irritation                              |
| Sk cor. Cat 1B, H314  | Skin corrosion, Category 1B, Causes severe skin burns.                                 |
| Eye Dam 1, H318       | Eye Damage Category 1, Causes serious eye damage                                       |
| Met.Cor. 1, H290      | Metal corrosion Category 1, May cause metal corrosion.                                 |
| STOT SE, 3, H335      | Specific target organ toxicity, single exposure, May cause respiratory irritation.     |
| Ac tox 4, H302        | Acute toxicity, Category 4, Harmful if swallowed                                       |
| Chr Aq tox 2, H411    | Chronic aquatic toxicity, Category 2, Toxic to aquatic life with long lasting effects. |
| WEL STEL              | Workplace Exposure Limit; Short term Exposure Limit                                    |
| TWA                   | Time weighted average  |

## RUTHENIUM – HCl

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| Revision history | Changes                         | Date       |
|------------------|---------------------------------|------------|
| Revision 2.0     | Document updated to GHS format. | 30-09-2024 |