Safety data sheet
According to Regulation n. 1907/2006 and Regulation 878/2020
RU IN HYDROCHLORIC SOLUTION

Revision 14 – 20.05.2025
Replaces revision 13 – 29.09.2023

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

1.1 Product identifier

Chemical name	RUTHENIUM IN HYDROCHLORIC SOLUTION
Product code	89
UFI code	9NJ5-S0Q8-U009-W2NR

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

Intended uses	Industrial use. Additive for electroplating
Uses adviced against	None in particular

1.3 Details of the supplier of the safety data sheet

Name	FAGGI ENRICO S.P.A.
Adress	Via Majorana, 101/103 50019 Sesto Fiorentino FI
Telephone number	055311861
Fax number	055311791
Competent person responsible for the safety data sheet	lorenzo.magaldi@faggi.it

1.4 Emergency telephone number 111 - Medical helpline operating in England, in Scotland (NHS 24) and in Wales (NHS Direct Wales).

1.5 REACH registration number

For this product a registration number is not available as the product is a mixture

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Hazard classes	Category codes	Hazard statements
Met. Corr.	1	H290
Acute Tox.	4	H302
Skin Corr.	1B	H314
Eye Dam.	1	H318
STOT SE	3	H335
Aquatic acute	1	H400
Aquatic chronic	1	H410

2.2 Label elements

Pictograms

Signal words **DANGER**

Hazard statements

H290	May be corrosive to metals
H302	Harmful if swallowed
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H335	Can irritate respiratory tract
H400	Very toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects

Precautionary statements P234 Keep in original sealed container

P280	Wear protective gloves / clothing. Protect eyes / face
P303+P361+P353	IN CASE OF CONTACT WITH SKIN (or hair): immediately take off contaminated clothing. Rinse the skin / take a shower
P305+P351+P338	IN CASE OF CONTACT WITH THE EYES: rinse thoroughly for several minutes. Remove any contact lenses if easy to do. Continue rinsing
P301 + P330+P331	IF SWALLOWED rinse mouth. Do not induce vomit.
P304+P340	IN CASE OF INHALATION: transport the injured person to fresh air and keep him in a position that favors INHALATION.

UFI code 9NJ5-S0Q8-U009-W2NR

2.3 Other hazards

It does NOT contain PBT / vPvB substances according to Regulation (EC) 1907/2006, annex XIII
It does NOT contain substances that interfere with the endocrine system in accordance with Regulation (EC) 1907/2006 art.59 paragraph 1 and in accordance with the criteria established in Regulation (EU) 2017/2100 and Regulation (EU) 2018/605.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixure

Product identificator	Concentration %	Classification	
		Hazard classes and category codes	Indications of danger
Hydrochloric acid CAS 7647-01-0 EC: 231-595-7 INDEX: 017-002-01-X REACH No. 01-211948862-27-XXXX ATE: not applicable Specific limits: C ≥ 25 % Eye damage 1 Corrosive to metals 1 Acute target organ toxicity single exposure 3 Skin corrosion 1A 10 % ≤ C < 25 %	9 ≤ C ≤ 12	Met corr. 1 Skin. corr. 1A Eye corr. 1 STOT SE 3	H290 H314 H318 H335

Eye damage 1
Corrosive to metals 1
Acute target organ toxicity single exposure 3
Skin corrosion 1B
1 % ≤ C < 10 %
Eye damage 1
Corrosive to metals 1
0.1 % ≤ C < 1 %
Corrosive to metals 1

Ruthenium trichloride	40 ≤ C ≤ 45	Met. Corr. 1	H290
CAS: 14898-67-0		Acute Tox. 4	H302
EC: 604-667-4		Skin Corr. 1B	H314
INDEX: not available		Eye Dam. 1	H318
N. Reach: exempt for quantity		Aquatic acute 1	H400
ATE LD50 (oral): 595 mg/kg bw (rat)		Aquatic Chronic 1	H410
M factor (acute): 1			
M factor (chronic): 1			

4. FIRST AID MEASURES

4.1 Description of first aid measures

Inhalation	Bring the injured person to fresh air. If breathing is stopped, give artificial respiration. Consult a physician.
Ingestion	Drink a lot of water. Do not induce vomiting. Consult a physician.
Contact with skin	Immediately wash skin with soap and plenty of water for at least 15 minutes. Remove contaminated clothing and wash it before reuse.
Contact with eyes	Rinse with plenty of running water for at least 15 minutes Do not use eye drops or ointments. Consult a physician.

Recommendations:	YES
• Need to see a doctor immediately	YES
• Possibility of delayed effects following exposure	YES
• Move the exposed individual from the place of exposure to the open air	YES
• Remove the clothing and shoes of the exposed individual	With gloves
• How to handle contaminated clothing	YES

4.2 Most important symptoms and effects, both acute and delayed

Eye, nose and throat irritation, chest pain, choking, skin irritation, corneal burns, skin burn (after severe exposure), nausea, vomiting. Abundant and haemorrhagic mucous secretions, bronchitis, pulmonary edema, corneal necrosis, tissue necrosis, gastrointestinal tract perforation

4.3 Indication of any immediate medical attention and special treatment needed

If you feel unwell, consult a doctor immediately. Emergency showers and eye washing systems must be available in the workplace.

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media	Carbon dioxide, foam, powder and water spray
Unsuitable extinguishing media	None in particolar

5.2 Special hazards arising from the substance or mixture

In the event of a fire, hydrochloric acid can be formed. The product reacts with metals to develop hydrogen, which is highly flammable.

5.3 Advice for firefighters

General information:	Prevent the water used to extinguish the fire from flowing into the sewer, groundwater or surface water. Cool containers at risk with water.
Equipment:	Normal fire-fighting clothing, such as self-contained open-circuit compressed air breathing apparatus (EN137), flame retardant suit (EN469), flame retardant gloves (EN659) and firefighter boots (HOA29 or A30)

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Keep away from contaminated area

6.1.2. For emergency responders

Wear :
Gloves for chemical risks compliant with EN420 EN374 Standards
Complete clothing compliant with the UNI EN 13034: 2006 standard
Semi-face masks with ABEK2P3 R filters conforming to EN14387: 2004 + A1: 2008

6.2 Environmental precautions

Prevent infiltration into the sewer, groundwater and surface water

6.3 Methods and material for containment and cleaning up

6.3.1. Advice in order to contain a spill

Contain spill with appropriate absorbent material (sand, sawdust) and keep in hermetic sealed container

6.3.2. Advice in order to clean-up a spill

Wash the area with plenty of water

6.3.3 **Other information**

None

6.4 Reference to other sections

None

7. HANDLING AND STORAGE

7.1. Precautions for safe handling

7.1.1. Raccomentations in order to manipulate the substance or the mixture in a safe manner, such as containement measures and prevention of fire and aereosol and powders formation

Keep in original closed and labeled container

7.1.2. General recommendation on work hygiene

Do not eat, drink and smoke in work areas. Wash your hands after use. Remove contaminated clothing and protective equipment before entering eating areas

7.2. Conditions for safe storage, including any incompatibilities

Keep away from bases, strong oxidants and metals

7.2.1. Risk management associated with explosive atmospheres, corrosive conditions, flammability hazards, incompatible substances or mixtures, evaporative conditions, potential ignition sources

Store in the original containers and close them immediately after use.

7.2.2. Control of weather conditions, ambient pressure, temperature, sunlight, humidity, and vibration

Store in a cool, dry place

7.2.3. Conditions to maintain the integrity of the substance or mixture

The packages must be well closed and labeled.

7.2.4. Advice regarding the ventilation, specific design for storage rooms or vessels, quantity limits under storage conditions, packaging compatibilities

Use PE and PP plastic packaging or other resistant materials. Keep the packages in a containment basin

7.3. Specific end use(s)

Industrial use. Additive for electroplating

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters for ruthenium chloride

DNEL

Workers

Systemic effects for long-term exposure – inhalation: 0.38 mg/m3
Systemic effects for short-term exposure – inhalation: no hazard identified
Local effects for long-term exposure – inhalation: medium hazard (no threshold derived)
Local effects for short-term exposure – inhalation: medium hazard (no threshold derived)
Systemic effects for long-term exposure – dermal: 0.27 mg/kg body weight per day
Systemic effects for short-term exposure – dermal: no hazard identified
Local effects for long-term exposure – dermal: medium hazard (no threshold derived)
Local effects for short-term exposure – dermal: medium hazard (no threshold derived)
Eye hazards: medium hazard (no threshold derived)

General population

Systemic effects for long-term exposure – inhalation: hazard unknown but no further hazard information necessary as no exposure expected
Systemic effects for short-term exposure – inhalation: hazard unknown but no further hazard information necessary as no exposure expected
Local effects for long-term exposure – inhalation: hazard unknown but no further hazard information necessary as no exposure expected
Local effects for short-term exposure – inhalation: hazard unknown but no further hazard information necessary as no exposure expected
Systemic effects for long-term exposure – dermal: hazard unknown but no further hazard information necessary as no exposure expected
Systemic effects for short-term exposure – dermal: hazard unknown but no further hazard information necessary as no exposure expected
Local effects for long-term exposure – dermal: hazard unknown but no further hazard information necessary as no exposure expected
Local effects for short-term exposure – dermal: hazard unknown but no further hazard information necessary as no exposure expected
Systemic effects for long-term exposure – oral: hazard unknown but no further hazard information necessary as no exposure expected
Systemic effects for short-term exposure – oral: hazard unknown but no further hazard information necessary as no exposure expected
Eye hazards: hazard unknown but no further hazard information necessary as no exposure expected

PNEC

Freshwater: 0.244 µg/L
Marine water: 0.024 µg/L

Sewer treatment plant: 8.92 mg/L
Sediment (freshwater): 7.62 mg/kg sediment dry weight
Sediment (marine water): 0.762 mg/kg sediment dry weight
Soil: 1.55 mg/kg soil dry weight

Control parameters for hydrochloric acid
DNEL
Workers
Systemic effects for long-term exposure – inhalation: no hazard identified
Systemic effects for short-term exposure – inhalation: no hazard identified
Local effects for long-term exposure – inhalation: 8 mg/m3
Local effects for short-term exposure – inhalation: 15 mg/m3
Systemic effects for long-term exposure – dermal: no hazard identified
Systemic effects for short-term exposure – dermal: no hazard identified
Local effects for long-term exposure – dermal: High hazard (no derived threshold)
Local effects for short-term exposure – dermal: High hazard (no derived threshold)
Hazards for eyes: Moderate risk (no derived threshold)
8-hour limit value: 5 ppm mg/m3 Legislative Decree 81/08 (IT)
Short-term limit value: 10 ppm 15 mg/m3 Legislative Decree 81/08
General population
Systemic effects for long-term exposure – inhalation: no hazard identified
Systemic effects for short-term exposure – inhalation: no hazard identified
Local effects for long-term exposure – inhalation: 8 mg/m3
Local effects for short-term exposure – inhalation: 15 mg/m3
Systemic effects for long-term exposure – dermal: no hazard identified
Systemic effects for short-term exposure – dermal: no hazard identified
Local effects for long-term exposure – dermal: High hazard (no derived threshold)
Local effects for short-term exposure – dermal: High hazard (no derived threshold)
Systemic effects for long-term exposure – oral: no hazard identified
Systemic effects for short-term exposure – oral: no hazard identified
Eye hazards: Moderate risk (no derived threshold)

PNEC
Fresh water: no hazard identified
Marine water: no hazard identified
Sewage Treatment Plant: No Hazard Identified
Sediment (Fresh Water): No Hazard Identified
Sediment (Marine Water): No Hazard Identified
Soil: No Hazard Identified

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Ventilation systems. Emergency showers and eye washing system near the work area. Periodically check the range of the extractor hood.

8.2.2. Individual protection measures, such as personal protective equipment

Eye/face protection	Protective goggles for eyes compliant with Directive 89/686 / EEC and with standard EN166: 2001
Skin protection (hands)	Chemical gloves according to EN 420 EN 374 Glove material: fluoro rubber, butyl rubber, chloroprene, nitrile rubber, PVC, latex Material thickness: 0.5 mm Penetration time: ≥ 60 min DIN EN374 method

Skin protection (body)	Complete antacid clothing compliant with the UNI EN 13034: 2006
Respiratory protection	Semi-face masks with ABEK2P3 R filters conforming to EN14387: 2004 + A1: 2008
Thermal hazards	Info not available

8.2.3. Environmental exposure controls

Maintain suction in all environments using localized collection systems and ambient air exchange. Convey the aspirated volumes to an abatement system and then into the atmosphere. Do not use recirculating air suction systems. Avoid any spillage into the environment.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state	Solid
Colour	Dark brown
Odour	Pungent
Melting point/freezing point	-46,2° C
Boiling point or initial boiling point and boiling range	57°C
Flammability	Not inflammable
Lower and upper explosion limit	Not explosive
Flash point	Not inflammable
Auto-ignition temperature	Not inflammable
Decomposition temperature	Unavailable
pH	<1
Kinematic viscosity	Undefined
Solubility	Fully miscible in water
Partition coefficient n-octanol/water (log value)	Not applicable
Vapour pressure	12.6 KPa
Density and/or relative density	1.35 g / ml
Relative vapour density	Unavailable
Particle characteristics	Not applicable

9.2. Other information

None

10. STABILITY AND REACTIVITY

10.1 Reactivity

Hydrochloric acid is a strong acid with corrosive action with numerous metals. It can produce corrosive vapors.

10.2 Chemical stability

Stable under normal storage conditions

10.3 Possibility of hazardous reactions

The product reacts with:
- common construction metals with evolution of highly flammable hydrogen gas,
- alkali and organic bases with violent evolution of heat,
- lime stone, marble, dolomite and other carbonic minerals with evolution of suffocating CO2 gas,
- strong oxidants (bleaching agents, conc. H2O2, HNO3, etc. and their salts, chromates, permanganates, etc) with evolution of toxic chlorine gas,
- sulphides with evolution of toxic H2S gas,

- sulphites, hydrogen sulphites and pyro sulphites with evolution of toxic SO2 gas,
- with sodium azide to highly toxic and explosive hydrazoic acid,
- any other chemical, that is prone to (dangerous) reaction/decomposition with acids

10.4 Conditions to avoid

Exposure to heat and sunlight.

10.5 Incompatible materials

Strong bases, metals

10.6 Hazardous decomposition products

It does not decompose but can develop hydrochloric acid vapors

11. TOXICOLOGICAL INFORMATION

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity	ATE (mixture): LD50 (oral): 1322 mg/kg bw (rat)
Skin corrosion / irritation	Mixture: causes severe skin burns
Serious eye damage/irritation	Mixture: causes serious eye damage
Respiratory or skin sensitization	Based on the available data, the classification criteria are not met
Germ cell mutagenicity	Based on the available data, the classification criteria are not met
Carcinogenicity	Based on the available data, the classification criteria are not met
Reproductive toxicity	Based on the available data, the classification criteria are not met
STOT – single exposure	Mixture: may cause respiratory irritation
STOT – repeated exposure	No data available

11.2 Information on other hazards

None

12. ECOLOGICAL INFORMATION (values relative to Hydrochloric acid)

12.1 Toxicity	Ruthenium (III) chloride: LC50 (96h)(fish): 0.38 mg Ru /L EC50 (72h)(algae): 0.602 mg/L
12.2 Persistence and degradability	It is not biodegradable and dissociates in water. Adsorption / desorption in the soil is impossible
12.3 Bioaccumulative potential	Insignificant given the high solubility in water
12.4 Mobility in soil	It does not reach sediment / soil and therefore cannot be ingested by birds or mammals
12.5 Results of PBT and vPvB assessment	Not applicable
12.6 Endocrine disrupting properties	No known effects
12.7 Other adverse effects	No known effects

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

The substance and its packaging must be disposed of as hazardous waste by authorized companies.

14. TRANSPORT INFORMATION

14.1 UN number or ID number 1760

14.2 **Official UN shipping name** UN1760, corrosive liquid, n.o.s. (hydrochloric acid, ruthenium chloride)

14.3 **Transport hazard class**
ADR/RID/IMDG/ICAO-IATA: Class: 8
ADR/RID/IMDG/ICAO-IATA: Label: 8
ADR: Tunnel restriction code: E
IMDG - EmS: F-A, S-B

14.4 **Packing group:** II

14.5 **Dangers for the environment**
ADR/RID/ICAO-IATA: yes
IMDG: Marine Contaminant: yes

14.6 **Special precautions for user**
Transport must be carried out by vehicles authorized for the transport of dangerous goods according to the provisions of the current edition of the A.D.R. Agreement. and the applicable national provisions. Transport must be carried out in the original packaging and, in any case, in packaging which is made of materials which cannot be attacked by the contents, and which are not likely to generate dangerous reactions. Those responsible for loading and unloading dangerous goods must have received appropriate training on the risks presented by the preparation and on any procedures to be adopted in the event of emergency situations.

14.7 **Maritime transport in bulk according to IMO instruments**
No bulk transport is foreseen

15. REGULATORY INFORMATION

15.1 **Safety, health and environmental regulations/legislation specific for the substance or mixture**

	Applicability
Reg. (EC) 1907/2006 / EC Reach	YES
Reg. (EC) 1272/2008 CLP and subsequent changes and additions	YES
Reg. (CE) 2037/2000 "Substances that deplete the ozone layer"	NO
Reg. (EC) 850/2004 "Persistent organic pollutants"	NO
Reg. (EC) 689/2008 "export and import of dangerous chemicals"	NO
Substance listed in Annex I of Dir. 2012/18 / EU so-called Seveso	NO
Legislative Decree 81/2008 Consolidated Law on health and safety at work	YES
Directive 2014/103 / EU "Adr"	YES
Reg. (CE) 1907/2006/CE Reach art. 59 – Candidate List of Substances of Very High Concern (SVHC)	NO
Reg. (CE) 1907/2006/CE Reach - Annex XIV – Authorisation List	NO
Reg. (CE) 1907/2006/CE Reach - Annex XVII – Restriction List	Limited use Item 3 - 75 (check link)
https://echa.europa.eu/it/substances-restricted-under-reach	

15.2 **Chemical safety assessment**
A chemical safety assessment was not carried out

16. OTHER INFORMATION

Changes compared to the previous edition
Changes to sections: 1-2-3-8-10-11-12-14

Acronim and abbreviation legend
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
GHS: Globally Harmonized System of Classification and Labeling of Substances

EINECS: European Inventory of Chemical Substances
CAS: Chemical Abstract Service
STA: Acute Toxicity Estimate
PBT: Persistent, Bioaccumulative and Toxic.
vPvB: (very persistent and very bioaccumulative). Very persistent and very bioaccumulative
LD: lethal dose
PNEC: predicted no effect concentration
DNEL: derived no effect level
TLV (ceiling value): threshold limit value
STEL: short-term exposure limit
EU-OEL: European occupational exposure limit
TWA: time-weighted average
EC: effective concentration
NOAEL: no observed adverse effect level
LC: lethal concentration
NOEC: no observed effect concentration
LOEC: lowest observed effect concentration
Bw: body weight
Koc: organic carbon-water partition coefficient

Main references and data sources

ECHA's data bank on registered substances and soon to be registered substances: https://chem.echa.europa.eu/

Indication, for mixtures, of which methods of evaluation of the information have been used for the purposes of classification

Classification		**Classification procedure**
Met. Corr.1	H290	Calculation
Acute Toxic 4	H302	Calculation
Skin Corr. 1	H314	According to 3.3.3.1.2 of Annex I to CLP
Eye Dam. 1	H318	According to 3.3.3.1.2 of Annex I to CLP
STOT SE 3	H335	Calculation
Aquatic acute 1	H400	Calculation
Aquatic Chronic 1	H410	Calculation

Adequate training for workers in order to ensure the protection of human health and the environment

Training on Chemical Risk pursuant to Legislative Decree 81/08 Title IX dangerous substances
PPE training