

Safety data sheet
According to Regulation n. 1907/2006 and Regulation 878/2020
RUTHENIUM TRICHLORIDE HYDRATE



Revision n. VII – 09.09.2024
 Replaces revision n. VI – 02.04.2024

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

- 1.1 Product identifier**
 Chemical name RUTHENIUM TRICHLORIDE HYDRATE
 Clorotris(trifenilfosfina)rodio(I) 123
 C.A.S. Registry Number 14898-67-0
 EC Number 604-667-4
 Molecular weight 261,47 g/mol (hydrate)
 Raw Formula $RuCl_3 \cdot nH_2O$
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**
 Intended uses Industrial use. Additive for electroplating
 Uses advised against None in particular
- 1.3 Details of the supplier of the safety data sheet**
 Name FAGGI ENRICO S.P.A.
 Address 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)
REACH registration number Exempt under Article 6(1)

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 damage	1	H318
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
 H410 Very toxic to aquatic life with long lasting effects

Precautionary statements

P273 Do not release into the environment
 P303 + P361 + P353 IF ON SKIN (or hair): take off immediately all contaminated

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P305 + P351 + P338	clothing. Rinse the skin / take a shower
P301 + P330 + P331	IF IN EYES: rinse thoroughly for several minutes. Remove any contact lenses if easy to do. Continue rinsing
P301 + P312	IF SWALLOWED, rinse mouth. Do not induce vomiting
P406	IF SWALLOWED: Call a POISON CENTER / doctor if you feel unwell Store in corrosive resistant / container with a resistant inner liner.

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

3.1 Substance: Ruthenium trichloride hydrate

CAS Number	14898-67-0
EC Number	233-167-5
Index number	Not available
ATE oral	LD50: 595 mg/kg bw (rat)
Acute toxicity M factor	1
Chronic toxicity M factor	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

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- How to handle contaminated clothing YES

4.2 Most important symptoms and effects, both acute and delayed

Irritation

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 particular

5.2 Special hazards arising from the substance or mixture

In the event of a fire, hydrochloric acid can be formed.

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)

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. Recommendations in order to manipulate the substance or the mixture in a safe manner, such as containment measures and prevention of fire and aerosol and powders formation

Keep in original sealed and labeled packaging

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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 food, drink and feed for animals

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.

7.3. Specific end use(s)

Industrial use

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

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

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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

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)

Gloves for chemical risks compliant with EN420 EN374 NOT disposable

Glove material: material impermeable to the substance

Material thickness: 0.5 mm

Penetration time: higher than expected for contact with the substance

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 air recirculation 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

black / dark brown

Odour

None

Melting point/freezing point

450 ° C

Boiling point or initial boiling point and boiling range

Not available

Flammability

Not inflammable

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Lower and upper explosion limit	Not explosive
Flash point	Not inflammable
Auto-ignition temperature	Not inflammable
Decomposition temperature	Not available
pH	Not available
Kinematic viscosity	Not applicable
Solubility	140 g / L at 20 ° C and pH 0.6
Partition coefficient n-octanol/water (log value)	Log Kow: 8 to 20 ° C

Vapour pressure	Not applicable
Density and/or relative density	2.9 g / cm ³
Relative vapour density	Not applicable
Particle characteristics	D <100 µm: 56.7%.

9.2. Other information

None

10. STABILITY AND REACTIVITY

10.1 Reactivity

No relevant information

10.2 Chemical stability

Stable under normal storage conditions

10.3 Possibility of hazardous reactions

None in particular

10.4 Conditions to avoid

Exposure to heat and sunlight.

10.5 Incompatible materials

Metals

10.6 Hazardous decomposition products

In case of strong heating it can develop vapors of hydrochloric acid

11. TOXICOLOGICAL INFORMATION

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

Acute toxicity	LD50 (oral) (rat): 595 mg / kg bw
Skin corrosion / irritation	Corrosive to the skin
Serious eye damage/irritation	Risk of serious eye damage.
Respiratory or skin sensitization	Based on available data, the classification criteria are not met
Germ cell mutagenicity	Based on available data, the classification criteria are not met
Carcinogenicity	Data not available
Reproductive toxicity	NOAEL (oral) (rat): 1276 mg/kg bw/day
STOT – single exposure	No data available

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	STOT – repeated exposure	NOAEL (oral)(rat): 407 mg / kg bw/day
11.2	Information on other hazards None	
12.	ECOLOGICAL INFORMATION	
12.1	Toxicity	LC50 (fish) > 0.94 mg /L
12.2	Persistence and degradability	EC10 (algae) 0.233 mg /L
12.3	Bioaccumulative potential	Not applicable
12.4	Mobility in soil	Not applicable
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	1759
14.2	Official UN shipping name	Corrosive solid, n.o.s. (ruthenium trichloride hydrate)
14.3	Transport hazard class ADR/RID/IMDG/ICAO-IATA: Class: ADR/RID/IMDG/ICAO-IATA: Label: ADR: Tunnel restriction code IMDG - EmS:	8 8 + mark environmental hazard E F-A, S-B
14.4	Packing group	II
14.5	Dangers for the environment	
14.6	ADR/RID/ICAO-IATA: IMDG: Marine Contaminant:	Product dangerous for environment YES
14.7	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

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and on any procedures to be adopted in the event of emergency situations.

No bulk transport is foreseen

15.	15.1	<p>Maritime transport in bulk according to IMO instruments</p> <p>REGULATORY INFORMATION</p> <p>Safety, health and environmental regulations/legislation specific for the substance or mixture</p> <p>Reg. (EC) 1907/2006 / EC Reach</p> <p>Reg. (EC) 1272/2008 CLP and subsequent changes and additions</p> <p>Reg. (CE) 2037/2000 "Substances that deplete the ozone layer"</p> <p>Reg. (EC) 850/2004 "Persistent organic pollutants"</p> <p>Reg. (EC) 689/2008 "export and import of dangerous chemicals"</p> <p>Substance listed in Annex I of Dir. 2012/18 / EU so-called Seveso</p> <p>Legislative Decree 81/2008 Consolidated Law on health and safety at work</p> <p>Directive 2014/103 / EU "Adr"</p> <p>Reg. (CE) 1907/2006/CE Reach art. 59 – Candidate List of Substances of Very High Concern (SVHC)</p> <p>Reg. (CE) 1907/2006/CE Reach - Annex XIV – Authorisation List</p> <p>Reg. (CE) 1907/2006/CE Reach - Annex XVII – Restriction List</p> <p>https://echa.europa.eu/it/substances-restricted-under-reach</p>	<p>Applicability</p> <p>YES</p> <p>YES</p> <p>NO</p> <p>NO</p> <p>NO</p> <p>NO</p> <p>NO</p> <p>YES</p> <p>YES</p> <p>NO</p> <p>NO</p> <p>Limited use Item 75 (check link)</p>
	15.2	<p>Chemical safety assessment</p> <p>A chemical safety assessment was not carried out</p>	
16.		<p>OTHER INFORMATION</p>	
	16.1	<p>Changes compared to the previous edition</p> <p>Changes to sections: 1-8-14-16</p>	
	16.2	<p>Acronim and abbreviation legend</p> <p>ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road</p> <p>GHS: Globally Harmonized System of Classification and Labeling of Substances</p> <p>EINECS: European Inventory of Chemical Substances</p> <p>CAS: Chemical Abstract Service</p> <p>STA: Acute Toxicity Estimate</p> <p>PBT: Persistent, Bioaccumulative and Toxic.</p> <p>vPvB: (very persistent and very bioaccumulative). Very persistent and very bioaccumulative</p> <p>LD: lethal dose</p> <p>PNEC: predicted no effect concentration</p> <p>DNEL: derived no effect level</p> <p>TLV (ceiling value): threshold limit value</p> <p>STEL: short-term exposure limit</p> <p>EU-OEL: European occupational exposure limit</p> <p>TWA: time-weighted average</p> <p>EC: effective concentration</p>	

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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

16.3 Main references and data sources

ECHA's data bank on registered substances and soon to be registered substances:

<https://chem.echa.europa.eu/>

16.5 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