

RX475 - Standard REDOX + 475mV**Safety Data Sheet**

According to Annex II to REACH - Regulation 2020/878 and to Annex II to UK REACH

SECTION 1. Identification of the substance/mixture and of the company/undertaking**1.1. Product identifier**

Code: **RX475**
Product name: **Standard REDOX + 475mV**

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

Intended use: **Standard solution for process verification and control. Applies to codes 32383153, 51100313, 51100323, EE51100313, EE51100323**

Identified Uses	Industrial	Professional	Consumer
Standard solution for the verification and quality control of redox potential measurement systems.	✓	✓	-

1.3. Details of the supplier of the safety data sheet

Name: **GIORGIO BORMAC srl**
Full address: **via della meccanica, 25**
District and Country: **41012 Carpi (MO) Italia**
Tel.: **+39 059 653274**
Fax: **+39 059 653282**

e-mail address of the competent person responsible for the Safety Data Sheet: **sds@giorgiobormac.com**

Supplier: **GIORGIO BORMAC srl**

1.4. Emergency telephone number

For urgent inquiries refer to: **+44 121 507 4123**

SECTION 2. Hazards identification**2.1. Classification of the substance or mixture**

The product is classified as hazardous pursuant to the provisions set forth in (EC) Regulation 1272/2008 (CLP) (and subsequent amendments and supplements). The product thus requires a safety datasheet that complies with the provisions of (EU) Regulation 2020/878.

Any additional information concerning the risks for health and/or the environment are given in sections 11 and 12 of this sheet.

Hazard classification and indication:

Substance or mixture corrosive to metals, category 1	H290	May be corrosive to metals.
Eye irritation, category 2	H319	Causes serious eye irritation.
Skin sensitization, category 1	H317	May cause an allergic skin reaction.

2.2. Label elements

Hazard labelling pursuant to EC Regulation 1272/2008 (CLP) and subsequent amendments and supplements.

Hazard pictograms:



Signal words: **Warning**

Hazard statements:

RX475 - Standard REDOX + 475mV**SECTION 2. Hazards identification ... / >>**

H290	May be corrosive to metals.
H319	Causes serious eye irritation.
H317	May cause an allergic skin reaction.

Precautionary statements:

P280	Wear protective gloves / eye protection / face protection.
P261	Avoid breathing dust / fume / gas / mist / vapours / spray.
P333+P313	If skin irritation or rash occurs: Get medical advice / attention.
P337+P313	If eye irritation persists: Get medical advice / attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P390	Absorb spillage to prevent material damage.

Contains: FERRIC CHLORIDE,SOLUTION

2.3. Other hazards

On the basis of available data, the product does not contain any PBT or vPvB in percentage \geq than 0,1%.

The product does not contain substances with endocrine disrupting properties in concentration \geq 0.1%.

SECTION 3. Composition/information on ingredients**3.2. Mixtures**

Contains:

Identification	x = Conc. %	Classification (EC) 1272/2008 (CLP)
Iron ammonium sulphate oso		
<i>INDEX</i>	$4 \leq x < 5$	
<i>EC</i> 233-151-8		
<i>CAS</i> 7783-85-9		
FERRIC CHLORIDE,SOLUTION		
<i>INDEX</i>	$1,5 \leq x < 2,5$	Met. Corr. 1 H290, Acute Tox. 4 H302, Eye Dam. 1 H318, Skin Irrit. 2 H315, Skin Sens. 1 H317 LD50 Oral: 440 mg/kg
<i>EC</i> 231-729-4		
<i>CAS</i> 7705-08-0		
<i>REACH Reg.</i> 01-2119497998-05-xxxx		
HYDROCHLORIC ACID		
<i>INDEX</i> 017-002-01-X	$0,1 \leq x < 0,5$	Met. Corr. 1 H290, Skin Corr. 1B H314, Eye Dam. 1 H318, STOT SE 3 H335, Classification note according to Annex VI to the CLP Regulation: B Met. Corr. 1 H290: \geq 0,1%, Skin Corr. 1B H314: \geq 25%, Skin Irrit. 2 H315: \geq 10%, Eye Dam. 1 H318: \geq 25%, Eye Irrit. 2 H319: \geq 10%, STOT SE 3 H335: \geq 10%
<i>EC</i> 231-595-7		
<i>CAS</i> 7647-01-0		
<i>REACH Reg.</i> 01-2119484862-27-xxxx		

The full wording of hazard (H) phrases is given in section 16 of the sheet.

SECTION 4. First aid measures**4.1. Description of first aid measures**

EYES: Remove contact lenses, if present. Wash immediately with plenty of water for at least 15 minutes, opening the eyelids fully. If problem persists, seek medical advice.

SKIN: Remove contaminated clothing. Rinse skin with a shower immediately. Get medical advice/attention immediately. Wash contaminated clothing before using it again.

INHALATION: Remove to open air. If the subject stops breathing, administer artificial respiration. Get medical advice/attention immediately.

INGESTION: Get medical advice/attention immediately. Do not induce vomiting. Do not administer anything not explicitly authorised by a doctor.

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

HYDROCHLORIC ACID
Acute effects-dependent effects.

RX475 - Standard REDOX + 475mV**SECTION 4. First aid measures ... / >>**

Cute: irritation, burns, ulcer
Eyes: irritation, corneal damage
Nose: irritation
First airways: irritation
Lungs: irritation
Digerent apparatus: if ingested retrostern and epigastric pain, hematemesis
Chronic effects.
Cute: irritation, depigmentation, dry skin, epilation
Eyes: irritation
Nose: irritation
First airways: irritation
Lungs: irritation

4.3. Indication of any immediate medical attention and special treatment needed

Causes serious eye irritation

SECTION 5. Firefighting measures

The product is not flammable and does not feed the flames

5.1. Extinguishing media

SUITABLE EXTINGUISHING EQUIPMENT

The extinguishing equipment should be of the conventional kind: carbon dioxide, foam, powder and water spray.

UNSUITABLE EXTINGUISHING EQUIPMENT

None in particular.

5.2. Special hazards arising from the substance or mixture

HAZARDS CAUSED BY EXPOSURE IN THE EVENT OF FIRE

Do not breathe combustion products.

5.3. Advice for firefighters

GENERAL INFORMATION

Use jets of water to cool the containers to prevent product decomposition and the development of substances potentially hazardous for health. Always wear full fire prevention gear. Collect extinguishing water to prevent it from draining into the sewer system. Dispose of contaminated water used for extinction and the remains of the fire according to applicable regulations.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE-FIGHTERS

Normal fire fighting clothing i.e. fire kit (BS EN 469), gloves (BS EN 659) and boots (HO specification A29 and A30) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

SECTION 6. Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**

Block the leakage if there is no hazard.

Wear suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing. These indications apply for both processing staff and those involved in emergency procedures.

6.2. Environmental precautions

The product must not penetrate into the sewer system or come into contact with surface water or ground water.

6.3. Methods and material for containment and cleaning up

Collect the leaked product into a suitable container. Evaluate the compatibility of the container to be used, by checking section 10. Absorb the remainder with inert absorbent material.

Make sure the leakage site is well aired. Contaminated material should be disposed of in compliance with the provisions set forth in point 13.

6.4. Reference to other sections

Any information on personal protection and disposal is given in sections 8 and 13.

RX475 - Standard REDOX + 475mV**SECTION 7. Handling and storage****7.1. Precautions for safe handling**

Ensure that there is an adequate earthing system for the equipment and personnel. Avoid contact with eyes and skin. Do not breathe powders, vapours or mists. Do not eat, drink or smoke during use. Wash hands after use. Avoid leakage of the product into the environment.

7.2. Conditions for safe storage, including any incompatibilities

Store only in the original container. Store in a ventilated and dry place, far away from sources of ignition. Keep containers well sealed. Keep the product in clearly labelled containers. Avoid overheating. Avoid violent blows. Keep containers away from any incompatible materials, see section 10 for details.

7.3. Specific end use(s)

Information not available

SECTION 8. Exposure controls/personal protection**8.1. Control parameters**

Regulatory References:

ESP	España	Límites de exposición profesional para agentes químicos en España 2021
ITA	Italia	Decreto Legislativo 9 Aprile 2008, n.81
GBR	United Kingdom	EH40/2005 Workplace exposure limits (Fourth Edition 2020)
EU	OEL EU	Directive (EU) 2022/431; Directive (EU) 2019/1831; Directive (EU) 2019/130; Directive (EU) 2019/983; Directive (EU) 2017/2398; Directive (EU) 2017/164; Directive 2009/161/EU; Directive 2006/15/EC; Directive 2004/37/EC; Directive 2000/39/EC; Directive 98/24/EC; Directive 91/322/EEC.
	TLV-ACGIH	ACGIH 2021

FERRIC CHLORIDE,SOLUTION**Threshold Limit Value**

Type	Country	TWA/8h		STEL/15min		Remarks / Observations
		mg/m3	ppm	mg/m3	ppm	
VLA	ESP	1				Como Fe
WEL	GBR	1		2		As Fe
TLV-ACGIH		1				Fe

Health - Derived no-effect level - DNEL / DMEL

Route of exposure	Effects on consumers				Effects on workers			
	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Oral		20 mg/kg bw/d		0,28 mg/kg bw/d				
Skin				1,4 mg/kg bw/d				2,8 mg/kg bw/d

HYDROCHLORIC ACID**Threshold Limit Value**

Type	Country	TWA/8h		STEL/15min		Remarks / Observations
		mg/m3	ppm	mg/m3	ppm	
VLEP	ITA	8	5	15	10	
OEL	EU	8	5	15	10	
TLV-ACGIH				2,98 (C)		A4 URT IRR

Health - Derived no-effect level - DNEL / DMEL

Route of exposure	Effects on consumers				Effects on workers			
	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Inhalation	15 mg/m3		8 mg/m3		15 mg/m3		8 mg/m3	

Legend:

(C) = CEILING ; INHAL = Inhalable Fraction ; RESP = Respirable Fraction ; THORA = Thoracic Fraction.

VND = hazard identified but no DNEL/PNEC available ; NEA = no exposure expected ; NPI = no hazard identified ; LOW = low hazard

; MED = medium hazard ; HIGH = high hazard.

RX475 - Standard REDOX + 475mV**SECTION 8. Exposure controls/personal protection ... / >>****HYDROCHLORIC ACID**

Sampling methods

The following sampling methods for the substances mentioned in the previous tables are suggested.

http://amcaw.ifa.dguv.de/substance/methoden/093- Hydrogen_chloride_2016.pdf.

8.2. Exposure controls

As the use of adequate technical equipment must always take priority over personal protective equipment, make sure that the workplace is well aired through effective local aspiration.

When choosing personal protective equipment, ask your chemical substance supplier for advice.

Personal protective equipment must be CE marked, showing that it complies with applicable standards.

Provide an emergency shower with face and eye wash station.

HAND PROTECTION

Protect hands with category III work gloves (see standard EN 374).

The following should be considered when choosing work glove material: compatibility, degradation, failure time and permeability.

The work gloves' resistance to chemical agents should be checked before use, as it can be unpredictable. The gloves' wear time depends on the duration and type of use.

SKIN PROTECTION

Wear category II professional long-sleeved overalls and safety footwear (see Regulation 2016/425 and standard EN ISO 20344). Wash body with soap and water after removing protective clothing.

EYE PROTECTION

Wear airtight protective goggles (see standard EN 166).

RESPIRATORY PROTECTION

If the threshold value (e.g. TLV-TWA) is exceeded for the substance or one of the substances present in the product, use a mask with a type B filter whose class (1, 2 or 3) must be chosen according to the limit of use concentration. (see standard EN 14387). In the presence of gases or vapours of various kinds and/or gases or vapours containing particulate (aerosol sprays, fumes, mists, etc.) combined filters are required.

Respiratory protection devices must be used if the technical measures adopted are not suitable for restricting the worker's exposure to the threshold values considered. The protection provided by masks is in any case limited.

If the substance considered is odourless or its olfactory threshold is higher than the corresponding TLV-TWA and in the case of an emergency, wear open-circuit compressed air breathing apparatus (in compliance with standard EN 137) or external air-intake breathing apparatus (in compliance with standard EN 138). For a correct choice of respiratory protection device, see standard EN 529.

ENVIRONMENTAL EXPOSURE CONTROLS

The emissions generated by manufacturing processes, including those generated by ventilation equipment, should be checked to ensure compliance with environmental standards.

SECTION 9. Physical and chemical properties**9.1. Information on basic physical and chemical properties**

Properties	Value	Information
Appearance	liquid	
Colour	yellow	
Odour	not available	
Melting point / freezing point	not available	
Initial boiling point	0 °C	
Flammability	not available	
Lower explosive limit	not available	
Upper explosive limit	not available	
Flash point	not available	
Auto-ignition temperature	not available	
Decomposition temperature	not available	
pH	0-0,5	
Kinematic viscosity	not available	
Solubility	soluble in water	
Partition coefficient: n-octanol/water	not available	
Vapour pressure	not available	
Density and/or relative density	1,035	
Relative vapour density	not available	
Particle characteristics	not applicable	

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Information not available

9.2.2. Other safety characteristics

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SECTION 9. Physical and chemical properties ... / >>

Danger of explosion

No

SECTION 10. Stability and reactivity

In the absence of information on the mixture, literature information is reported on the components. This information is not characteristic of the solution but of dangerous components.

10.1. Reactivity

There are no particular risks of reaction with other substances in normal conditions of use.

Iron ammonium sulphate oso

Easily oxidable in contact with the environment

FERRIC CHLORIDE,SOLUTION

Corrode: Metals.

HYDROCHLORIC ACID

The water solution is a strong acid (IPCS, 2000).

By decomposition it develops hydrogen.

10.2. Chemical stability

The product is stable in normal conditions of use and storage.

Iron ammonium sulphate oso

A strong heating leads to decomposition.

Release crystallization water when heated.

HYDROCHLORIC ACID

The aqueous solutions are stable

10.3. Possibility of hazardous reactions

No hazardous reactions are foreseeable in normal conditions of use and storage.

FERRIC CHLORIDE,SOLUTION

It reacts violently by developing heat in contact with: Allile chloride, aluminum.

Avoid exposure to: wet air. It can develop: hydrochloric acid.

Risk of explosion in contact with: alkaline metals, ethylene oxide.

HYDROCHLORIC ACID

It reacts violently with bases and obsidants, developing toxic gaseous chlorine (IPCS, 2000). Attack many metals in the presence of water.

This produces flammable/explosive gaseous hydrogen (IPCS, 2000).

10.4. Conditions to avoid

None in particular. However the usual precautions used for chemical products should be respected.

Iron ammonium sulphate oso

Heating (decomposition).

HYDROCHLORIC ACID

High temperature

10.5. Incompatible materials

Iron ammonium sulphate oso

Concentrated sulfuric acid.

FERRIC CHLORIDE,SOLUTION

Incompatible with: strong oxidants agents, potassium, alkaline metals, aluminum powder, alcohol.

HYDROCHLORIC ACID

Strong oxidant agents, bases, fluorine, amines, reducing agents, metals.

10.6. Hazardous decomposition products

Iron ammonium sulphate oso

Sulfoxides. Nitrogen oxides.

RX475 - Standard REDOX + 475mV**SECTION 10. Stability and reactivity ... / >>****HYDROCHLORIC ACID**

Hydrochloric acid, chlorine dioxide.

For thermal decomposition or in the event of a fire you can free gases and vapors potentially harmful to health (gaseous hydrochloric acid)

SECTION 11. Toxicological information

In the absence of experimental data for the product itself, health hazards are evaluated according to the properties of the substances it contains, using the criteria specified in the applicable regulation for classification.

It is therefore necessary to take into account the concentration of the individual hazardous substances indicated in section 3, to evaluate the toxicological effects of exposure to the product.

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008Metabolism, toxicokinetics, mechanism of action and other information**HYDROCHLORIC ACID**

Following inhalation or ingestion it is quickly separated in H⁺ and Cl⁻ which after entering the circle is eliminated with the urine.

The activity of hydrogen chloride is associated with its high solubility in water, where it dissociates almost completely. The hydrogen ion forms with the water ion hydronio, this becomes a donor of a proton that has catalytic properties and is therefore capable of reacting with organic molecules. This explains the ability of hydrogen chloride to induce cellular lesions and necrosis.

Information on likely routes of exposure**HYDROCHLORIC ACID**

In the professional field, the main exposure routes are the inhalation and the skin.

The general population can be exposed to inhalation, ingestion, skin and eye contact.

Exposure to aerosols locally involves chemical burns whose gravity is according to the concentration of the solution, the importance of contamination and the duration of contact.

At the skin level, warm and painful erythema can be observed, fops or necrosis. Evolution can be complicated with overinfections, aesthetic or functional sequences.

At the eye level there is immediate pain, tearing, conjunctival hyperemia and often blepharospasm. Sequel can be: conjunctival adhesions, corneal opacity, cataracts, glaucoma and even blindness.

The exposure by inhalation to its vapors or aerosols immediately causes irritation of the respiratory system.

In the form of aerosol, the lesions depend on the sizes of the Airosol particles. You can have ricorrhea, sneezing, sensation of nasal and pharyngeal burning, cough, dyspnea, chest pain. Important complications are laryngeal or bronchospasm edema.

The ingestion of concentrated solutions determines buccal, retrostern and epigastric pain associated with hypersciaralorrhea and frequently bloody vomiting. There is metabolic acidosis and an increase in tissue enzymes due to necrosis, hyperleucocytosis, emolis and hypercloremia.

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

A quick evaporation of the liquid can cause freezing (IPCS, 2000).

The inhalation of high gas concentrations can cause pneumonia and pulmonary edema with consequent reactive airway syndrome (Rads) (bronchial hyperreactivity). The effects can be delayed (IPCS, 2000).

Exposure to aerosols of solutions leads locally chemical burns whose gravity is according to the concentration of the solution, the importance of contamination and the duration of contact.

At the skin level, warm and painful erythema can be observed, fops or necrosis. Evolution can be complicated with overinfections, aesthetic or functional sequences.

At the eye level there is immediate pain, tearing, conjunctival hyperemia and often blepharospasm. Sequel can be: conjunctival adhesions, corneal opacity, cataracts, glaucoma and even blindness.

The exposure by inhalation to its vapors or aerosols immediately causes irritation of the respiratory system.

In the form of aerosol, the lesions depend on the sizes of the Airosol particles. You can have ricorrhea, sneezing, sensation of nasal and pharyngeal burning, cough, dyspnea, chest pain. Important complications are laryngeal or bronchospasm edema.

Upon cessation of exposure, the symptoms almost always regress, but in some cases you can have delayed pulmonary edema within 48 hours.

Secondary infections are a frequent complication.

At the expense of the respiratory system, in the event of extensive injuries, bronchial hypersecretion and the desquamation of the bronchial mucosa determine truncular obstruction and atheighting. Sequence for the respiratory system are: asthma (books of books), bronchial stenosis, bronchiectasias and pulmonary fibrosis.

The ingestion of concentrated solutions determines buccal, retrostern and epigastric pain associated with hypersciaralorrhea and frequently bloody vomiting. There is metabolic acidosis and an increase in tissue enzymes due to necrosis, hyperleucocytosis, emolis and hypercloremia.

The short-term complications are: esophageal or gastric perforation or digestive bleeding, fistulas, breathing difficulties for laryngeal edema, esophagus-tracheal fistula, shock, disseminated intravascular coagulation.

Long -term complications are: digestive stenosis, in particular esopharyngeal.

The exposure repeated to its vapors or aerosols of aqueous solutions can cause irritative effects: dermatitis and conjunctivitis; ulcerations of the nasal mucosa, buccal, epistaxis and gingivorragias; Dental erosions, chronic bronchitis (inrs, 2010).

Interactive effects

RX475 - Standard REDOX + 475mV**SECTION 11. Toxicological information ... / >>**

Information not available

ACUTE TOXICITY

ATE (Inhalation) of the mixture: Not classified (no significant component)
ATE (Oral) of the mixture: >2000 mg/kg
ATE (Dermal) of the mixture: Not classified (no significant component)

Iron ammonium sulphate oso
LD50 (Oral): 3250 mg/kg ratto

FERRIC CHLORIDE,SOLUTION
LD50 (Dermal): > 2000 mg/kg Rat
LD50 (Oral): 440 mg/kg Rat
LC50 (Inhalation mists/powders): 0,3 mg/l/4h Rat

FERRIC CHLORIDE,SOLUTION
LD50 (oral): 1300 mg/ kg BW/ Fecl3/ Studio of 1970/ Topo Queckenbusch

HYDROCHLORIC ACID
RATTO DL50 (oral): 700 mg/kg (inrs, 2010)
Rabbit DL50 (skin):> 5010 mg/kg (on, 2010)
Ratto CL50-30 minutes (inhalation): 5.7 - 8.3 mg/l (aerosol) (in, 2010).

SKIN CORROSION / IRRITATION

Does not meet the classification criteria for this hazard class

HYDROCHLORIC ACID
Exposure to aerosols locally involves chemical burns whose gravity is according to the concentration of the solution, the importance of contamination and the duration of contact (in, 2010).
At the skin level, warm and painful erythema can be observed, flops or necrosis. Evolution can be complicated with superinfections, aesthetic or functional sequences (inrs, 2010).
In animals concentrations between 3.3% and 17% are irritating for the skin; higher concentrations become corrosive (inrs, 2010).

SERIOUS EYE DAMAGE / IRRITATION

Causes serious eye irritation

HYDROCHLORIC ACID
Exposure to aerosols locally involves chemical burns whose gravity is according to the concentration of the solution, the importance of contamination and the duration of contact (in 2010).
At the eye level there is immediate pain, tearing, conjunctival hyperemia and often blepharospasm. The sequels can be: conjunctival adhesions, corneal opacity, cataracts, glaucoma and even blindness (on, 2010).
In animals, concentrations above 3.3% cause serious eye irritation; Symptoms can include redness, swelling, pain and tears.
A prolonged exposure or at higher concentrations induces opacity of the cornea, ulceration and decrease in view with the risk of permanent alteration. The severity of irritation is linked to the duration of the treatment (tears have buffer effect and dilute). In the rabbit, 0.1 ml of an aqueous solution at 10% causes permanent alteration of the vision; The non -irritating concentration is 0.33% (inrs, 2010).

RESPIRATORY OR SKIN SENSITISATION

Sensitising for the skin

Skin sensitization

HYDROCHLORIC ACID
Negative results in the maximization test in the guinea pig (induction and unleashing: solution to 1 %) and in the test of the swelling of the ear in the mouse (induction at 1 %, 5 %unleashing) (Inrs, 2010).

GERM CELL MUTAGENICITY

Does not meet the classification criteria for this hazard class

HYDROCHLORIC ACID
In single studies, hydrochloric acid has induced chromium-somic mutual changes and aberrations in mammal cells.
He also induced chromosomal aberrations in insects and plants. He did not induce bacteria mutations (Iarc, 1992).

CARCINOGENICITY

RX475 - Standard REDOX + 475mV**SECTION 11. Toxicological information ... / >>**

Does not meet the classification criteria for this hazard class

HYDROCHLORIC ACID

In a study on deduction workers of the steel, an excess risk of pulmonary cancer in workers exposed mainly to hydrochloric acid was observed. In the same cohort, a increased risk of lady cancer was observed, however, no analysis was conducted on workers exposed to hydrochloric acid. Three studies control in industrial plants do not indicate any association between exposure to hydrochloric acid and cancer against lungs, brain or kidneys. A Canadian control case indicates increased risk for microcytoma in workers exposed to hydrochloric acid; However, no excess risk was observed for other histological types of lung cancer (Iarc, 1992). In a study in rats m. Exposed for inhalation for the entire life of life at a dose level, hydrogen chloride has not been observed related increase in treatment in the incidence of tumors (Iarc, 1992).

The International Agency for Research on Cancer (IARC) allocates hydrochloric acid in group 3 (not classifiable as a carcinogen for humans) on the basis of evidence of inadequate carcinogenicity both in man and animals (Iarc, 1992).

In addition, in a recent evaluation, the data showed association between exposure to mists of strong inorganic acids and laryngeal cancer in the man while they were limited to affirm a causal association with bronchial cancer. The man was also observed in the positive association between exposure to mists of strong inorganic acids and lung cancer (Iarc, 2012)

- The International Agency for Research on Cancer (IARC) allocates the mists of strong inorganic acids in group 1 (carcinogen ascertained for humans) on the basis of evidence of sufficient carcinogenicity in humans (cancer against the larynx and positive association between exposure to mists of strong inorganic acids and lung cancer) (Iarc, 2012).

REPRODUCTIVE TOXICITY

Does not meet the classification criteria for this hazard class

Adverse effects on sexual function and fertility**HYDROCHLORIC ACID**

There are no data on humans that allow to evaluate the effects for reproduction of hydrogen chloride exposure. These effects do not seem plausible in professional exposure conditions (in, 2010).

In rats (females) exposed to hydrochloric acid at 450 mg/m³ for 1 hour, both 12 days before the mating and on the 9th day of gestation, effects were observed only at toxic concentrations for mothers (in the, 2010).

Reliable studies on toxicity for reproduction and development in animals are not available after oral, skin or inhalation exposure to hydrochloric acid. Since protons and chloride ions are normal constituents in the body fluids of animal species, low concentrations of gas/mists or of hydrochloric acid solutions do not seem to cause adverse effects in animals. In fact, the cells of gastric glands secrete hydrochloric acid in the cavity of the stomach and also the oral administration of sulfuric acid which determines alteration of the pH, have not caused toxicity on the development in laboratory animals. These facts indicate that the hydrogen chloride and hydrogen chloride present toxicity for development is not expected. Furthermore, in a 90 -day inhalation study of good quality, concentrations up to 50 ppm of the substance did not produce any effect on the Gonadi (Oecd, 2002).

Adverse effects on development of the offspring**HYDROCHLORIC ACID**

There are no data on humans that allow to evaluate the effects for reproduction of hydrogen chloride exposure. These effects do not seem plausible in professional exposure conditions (in, 2010).

In rats (females) exposed to hydrochloric acid at 450 mg/m³ for 1 hour, both 12 days before the mating and on the 9th day of gestation, effects were observed only at conc. Toxic for mothers (inrs, 2010).

Reliable studies on toxicity for reproduction and development in animals are not available after oral, skin or inhalation exposure to hydrochloric acid. Since protons and chloride ions are normal constituents in the body fluids of animal species, low conc. of gas/mists or hydrochloric acid solutions do not seem to cause adverse effects in animals. In fact, the cells of gastric glands secrete hydrochloric acid in the cavity of the stomach and also the oral administration of sulfuric acid which determines alteration of the pH, have not caused toxicity on the development in laboratory animals.

These facts indicate that the hydrogen chloride and hydrogen chloride present toxicity for development is not expected. Furthermore, in a 90 -day inhalation study of good quality, conc. Up to 50 ppm of the substance did not produce any effect on the Gonadi (Oecd, 2002).

Effects on or via lactation

Information not available

STOT - SINGLE EXPOSURE

Does not meet the classification criteria for this hazard class

HYDROCHLORIC ACID

The exposure by inhalation immediately causes irritation of the respiratory system (inrs, 2010).

In the form of aerosol, the lesions depend on the sizes of the Airosol particles. You can have ricorrhea, sneezing, sensation of nasal and pharyngeal burning, cough, dyspnea, chest pain. Important complications are laryngeal or bronchospasm edema (inrs, 2010).

Target organs

Information not available

RX475 - Standard REDOX + 475mV**SECTION 11. Toxicological information ... / >>**Route of exposure

Information not available

STOT - REPEATED EXPOSURE

Does not meet the classification criteria for this hazard class

FERRIC CHLORIDE,SOLUTION

Oral:

Noael = 277 mg/kg bw/day - Fischer 344 - Oecd 408

Loael = 554 mg / kg bw / day

Inhalation:

Loael of 1.4 mg FE / m³ (Aerosol Fecl3) - rabbit

HYDROCHLORIC ACID

The exposure by inhalation immediately causes irritation of the respiratory system (inrs, 2010).

In the form of aerosol, the lesions depend on the sizes of the Airosol particles. You can have ricorrhea, sneezing, sensation of nasal and pharyngeal burning, cough, dyspnea, chest pain. Important complications are laryngeal or bronchospasm edema (inrs, 2010).

Target organs

Information not available

Route of exposure

Information not available

ASPIRATION HAZARD

Does not meet the classification criteria for this hazard class

11.2. Information on other hazards

Based on the available data, the product does not contain substances listed in the main European lists of potential or suspected endocrine disruptors with human health effects under evaluation.

SECTION 12. Ecological information

Use this product according to good working practices. Avoid littering. Inform the competent authorities, should the product reach waterways or contaminate soil or vegetation.

12.1. Toxicity

Iron ammonium sulphate oso

Ce50/48h 315 mg/l (fish) (Fundulus Hetericlitus)

HYDROCHLORIC ACID

Short -term effects

Fish (Cyprinus Carpio) CL50-96 hours: 4.92 mg/l a pH 4.3 [OECD 203] (Oecd Sids, 2002).

Fish (Gambusia Affinis) CL50-96 hours = 282 mg/l (pH 6.0-8,2) (HSDB, 2015).

Crustaceans (Daphnia Magna) Ce50-48 hours = 0.492 mg/l (Ph 5,3) [Oecd 202] (Oecd Sids, 2002).

Alga (pseudokirkinchneriella subcapitated) cbe50-72 hours = 0.780 mg/l (pH 5.1); Cbe50-72 hours = 0.492 mg/l (Ph 5,3) [Oecd 201] (Oecd Sids, 2002).

In the air it can be phytotoxic.

Tomatoes, sugar beets and some fruit trees are sensitive to hydrogen chloride in the air (HSDB, 2015).

The aqueous solutions of hydrochloric acid have a corrosive action on plant tissues.

Long -term effects

Algae (pseudokirkinchneriella subcapitated) Noec = 0.097 mg/l (Ph 6.0) [Oecd 201] (effect: growth rate and biomass) (Oecd Sids, 2002).

FERRIC CHLORIDE,SOLUTION

LC50 - for Fish

20,3 mg/l/96h FeCl3.6H2O Lepomis macrochirus Birge et al. 1985

EC50 - for Crustacea

9,6 mg/l/48h FeCl3.6H2O Daphnia magna Biesinger & Christensen 1972

EC50 - for Algae / Aquatic Plants

15 mg/l/72h Anabaena circinalis Chow et al. 1998

Chronic NOEC for Crustacea

2,51 mg/l 21d Daphnia pulex FeCl3.6H2O Birge at al. 1985

Chronic NOEC for Algae / Aquatic Plants

50 mg/l 10d Anabaena doliolu Pany & Mitra 1998

12.2. Persistence and degradability

RX475 - Standard REDOX + 475mV**SECTION 12. Ecological information ... / >>**

FERRIC CHLORIDE,SOLUTION

Hydrolysis value: 70% in 19 hours and 90% in 36 hours

HYDROCHLORIC ACID

In the water it dissociates.

The substance is not photo -degradable.

FERRIC CHLORIDE,SOLUTION

Solubility in water

919 mg/l FeCl₃ esaidrato

Rapidly degradable

Iron ammonium sulphate oso

Rapidly degradable

12.3. Bioaccumulative potential

Iron ammonium sulphate oso

It does not accumulate in organisms.

HYDROCHLORIC ACID

Bioconcentration is not significant.

BCF given not available.

12.4. Mobility in soil

HYDROCHLORIC ACID

It is mobile on the ground

12.5. Results of PBT and vPvB assessmentOn the basis of available data, the product does not contain any PBT or vPvB in percentage \geq than 0,1%.**12.6. Endocrine disrupting properties**

HYDROCHLORIC ACID

Despite the dilution, it shapes with water still corrosive mixtures. Harmful effect due to the variation of the pH.

Based on the available data, the product does not contain substances listed in the main European lists of potential or suspected endocrine disruptors with environmental effects under evaluation.

12.7. Other adverse effects

Information not available

SECTION 13. Disposal considerations**13.1. Waste treatment methods**

Reuse, when possible. Product residues should be considered special hazardous waste. The hazard level of waste containing this product should be evaluated according to applicable regulations.

Disposal must be performed through an authorised waste management firm, in compliance with national and local regulations.

Waste transportation may be subject to ADR restrictions.

CONTAMINATED PACKAGING

Contaminated packaging must be recovered or disposed of in compliance with national waste management regulations.

SECTION 14. Transport information**14.1. UN number or ID number**

ADR / RID, IMDG, IATA: 1760

14.2. UN proper shipping name

ADR / RID: CORROSIVE LIQUID, N.O.S. (HYDROCHLORIC ACID)

IMDG: CORROSIVE LIQUID, N.O.S. (HYDROCHLORIC ACID)

IATA: CORROSIVE LIQUID, N.O.S. (HYDROCHLORIC ACID)

RX475 - Standard REDOX + 475mV**SECTION 14. Transport information ... / >>****14.3. Transport hazard class(es)**

ADR / RID: Class: 8 Label: 8



IMDG: Class: 8 Label: 8



IATA: Class: 8 Label: 8

**14.4. Packing group**

ADR / RID, IMDG, IATA: III

14.5. Environmental hazardsADR / RID: NO
IMDG: NO
IATA: NO**14.6. Special precautions for user**

ADR / RID:	HIN - Kemler: 80 Special provision: -	Limited Quantities: 5 L	Tunnel restriction code: (E)
IMDG:	EMS: F-A, S-B	Limited Quantities: 5 L	
IATA:	Cargo: Pass.: Special provision:	Maximum quantity: 60 L Maximum quantity: 5 L A3, A803	Packaging instructions: 856 Packaging instructions: 852

14.7. Maritime transport in bulk according to IMO instruments

Information not relevant

SECTION 15. Regulatory information**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**Seveso Category - Directive 2012/18/EU: NoneRestrictions relating to the product or contained substances pursuant to Annex XVII to EC Regulation 1907/2006Product
Point 3Contained substance
Point 75Regulation (EU) 2019/1148 - on the marketing and use of explosives precursors
not applicableSubstances in Candidate List (Art. 59 REACH)
On the basis of available data, the product does not contain any SVHC in percentage \geq than 0,1%.Substances subject to authorisation (Annex XIV REACH)
NoneSubstances subject to exportation reporting pursuant to Regulation (EU) 649/2012:
NoneSubstances subject to the Rotterdam Convention:
NoneSubstances subject to the Stockholm Convention:
NoneHealthcare controls

RX475 - Standard REDOX + 475mV**SECTION 15. Regulatory information ... / >>**

Workers exposed to this chemical agent must not undergo health checks, provided that available risk-assessment data prove that the risks related to the workers' health and safety are modest and that the 98/24/EC directive is respected.

15.2. Chemical safety assessment

A chemical safety assessment has been performed for the following contained substances
HYDROCHLORIC ACID

SECTION 16. Other information

Text of hazard (H) indications mentioned in section 2-3 of the sheet:

Met. Corr. 1	Substance or mixture corrosive to metals, category 1
Acute Tox. 4	Acute toxicity, category 4
Skin Corr. 1B	Skin corrosion, category 1B
Eye Dam. 1	Serious eye damage, category 1
Eye Irrit. 2	Eye irritation, category 2
Skin Irrit. 2	Skin irritation, category 2
STOT SE 3	Specific target organ toxicity - single exposure, category 3
Skin Sens. 1	Skin sensitization, category 1
H290	May be corrosive to metals.
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H315	Causes skin irritation.
H335	May cause respiratory irritation.
H317	May cause an allergic skin reaction.

LEGEND:

- ADR: European Agreement concerning the carriage of Dangerous goods by Road
- ATE: Acute Toxicity Estimate
- CAS: Chemical Abstract Service Number
- CE50: Effective concentration (required to induce a 50% effect)
- CE: Identifier in ESIS (European archive of existing substances)
- CLP: Regulation (EC) 1272/2008
- DNEL: Derived No Effect Level
- EmS: Emergency Schedule
- GHS: Globally Harmonized System of classification and labeling of chemicals
- IATA DGR: International Air Transport Association Dangerous Goods Regulation
- IC50: Immobilization Concentration 50%
- IMDG: International Maritime Code for dangerous goods
- IMO: International Maritime Organization
- INDEX: Identifier in Annex VI of CLP
- LC50: Lethal Concentration 50%
- LD50: Lethal dose 50%
- OEL: Occupational Exposure Level
- PBT: Persistent bioaccumulative and toxic as REACH Regulation
- PEC: Predicted environmental Concentration
- PEL: Predicted exposure level
- PNEC: Predicted no effect concentration
- REACH: Regulation (EC) 1907/2006
- RID: Regulation concerning the international transport of dangerous goods by train
- TLV: Threshold Limit Value
- TLV CEILING: Concentration that should not be exceeded during any time of occupational exposure.
- TWA: Time-weighted average exposure limit
- TWA STEL: Short-term exposure limit
- VOC: Volatile organic Compounds
- vPvB: Very Persistent and very Bioaccumulative as for REACH Regulation
- WGK: Water hazard classes (German).

GENERAL BIBLIOGRAPHY

1. Regulation (EC) 1907/2006 (REACH) of the European Parliament
2. Regulation (EC) 1272/2008 (CLP) of the European Parliament
3. Regulation (EU) 2020/878 (II Annex of REACH Regulation)
4. Regulation (EC) 790/2009 (I Atp. CLP) of the European Parliament
5. Regulation (EU) 286/2011 (II Atp. CLP) of the European Parliament
6. Regulation (EU) 618/2012 (III Atp. CLP) of the European Parliament
7. Regulation (EU) 487/2013 (IV Atp. CLP) of the European Parliament
8. Regulation (EU) 944/2013 (V Atp. CLP) of the European Parliament

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SECTION 16. Other information ... / >>

9. Regulation (EU) 605/2014 (VI Atp. CLP) of the European Parliament
10. Regulation (EU) 2015/1221 (VII Atp. CLP) of the European Parliament
11. Regulation (EU) 2016/918 (VIII Atp. CLP) of the European Parliament
12. Regulation (EU) 2016/1179 (IX Atp. CLP)
13. Regulation (EU) 2017/776 (X Atp. CLP)
14. Regulation (EU) 2018/669 (XI Atp. CLP)
15. Regulation (EU) 2019/521 (XII Atp. CLP)
16. Delegated Regulation (UE) 2018/1480 (XIII Atp. CLP)
17. Regulation (EU) 2019/1148
18. Delegated Regulation (UE) 2020/217 (XIV Atp. CLP)
19. Delegated Regulation (UE) 2020/1182 (XV Atp. CLP)
20. Delegated Regulation (UE) 2021/643 (XVI Atp. CLP)
21. Delegated Regulation (UE) 2021/849 (XVII Atp. CLP)
22. Delegated Regulation (UE) 2022/692 (XVIII Atp. CLP)

- The Merck Index. - 10th Edition
- Handling Chemical Safety
- INRS - Fiche Toxicologique (toxicological sheet)
- Patty - Industrial Hygiene and Toxicology
- N.I. Sax - Dangerous properties of Industrial Materials-7, 1989 Edition
- IFA GESTIS website
- ECHA website
- Database of SDS models for chemicals - Ministry of Health and ISS (Istituto Superiore di Sanità) - Italy

Note for users:

The information contained in the present sheet are based on our own knowledge on the date of the last version. Users must verify the suitability and thoroughness of provided information according to each specific use of the product.

This document must not be regarded as a guarantee on any specific product property.

The use of this product is not subject to our direct control; therefore, users must, under their own responsibility, comply with the current health and safety laws and regulations. The producer is relieved from any liability arising from improper uses.

Provide appointed staff with adequate training on how to use chemical products.

CALCULATION METHODS FOR CLASSIFICATION

Chemical and physical hazards: Product classification derives from criteria established by the CLP Regulation, Annex I, Part 2. The data for evaluation of chemical-physical properties are reported in section 9.

Health hazards: Product classification is based on calculation methods as per Annex I of CLP, Part 3, unless determined otherwise in Section 11.

Environmental hazards: Product classification is based on calculation methods as per Annex I of CLP, Part 4, unless determined otherwise in Section 12.

Changes to previous review:

The following sections were modified:

01 / 03 / 04.