# Safety Data Sheet

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

### 1.1 Product Identifier

| | |
|---|---|
| Name | **MIXTURE OF ZINC CHLORIDE AND AMMONIUM CHLORIDE IN AQUEOUS SOLUTION (DOUBLE SALT IN AQUEOUS SOLUTION, CONCENTRATION ≥ 45%)** |
| Trade name | **MIXTURE OF ZINC CHLORIDE AND AMMONIUM CHLORIDE IN AQUEOUS SOLUTION (DOUBLE SALT IN AQUEOUS SOLUTION, CONCENTRATION ≥ 45%)** |
| UFI | **TTHU-TRKP-K508-GWYN** |

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

**Relevant identified uses**
The mixture is used for the surface treatment of metals prior to galvanising.

**Uses advised against**
Uses other than industrial uses indicated in the previous paragraph and described in the attached exposure scenarios.

### 1.3 Details of the Supplier on the Safety Data Sheet

| | |
|---|---|
| Business name | **Sanimet S.p.A.** |
| Address | **Via S. Quasimodo, 19-23** |
| Town and Country | **25010 Flero (BS) - Italy** |
| Telephone | **+390303583686** |
| Fax | **+390302684659** |
| e-mail address of the person responsible for the safety data sheet | **info@sanimet.it** |

### 1.4 Emergency telephone number

For urgent inquiries refer to:

- Sanimet SpA – Via S. Quasimodo, 19-23 – 25020 Flero (BS)
  Ph. +390303583686 Active Monday to Friday, 8:30 a.m. to 5:30 p.m.
- Poison control centres (H24):
  Milan Poison Control Centre Ph. +39 02 66101029 (CAV Niguarda Ca' Granda Hospital - Milan)
  Poison Control Center of Pavia Ph. +39 0382 24444 (CAV IRCCS Fondazione Maugeri-Pavia)
  Bergamo Poison Control Centre Ph. +39 800 883300 (CAV Azienda Ospedaliera Papa Giovanni XXII)
  Florence Poison Control Centre Ph. +39 055 7947819 (CAV Caredayi Hospital - Florence)
  Rome Poison Control Centre Ph. +39 06 3054343 (CAV Policlinico Gemelli - Rome)
  Poison Control Center Rome Ph. +39 06 49978000 (CAV Policlinico Umberto I – Rome)
  Rome Poison Control Centre Ph. +39 06 68593726 (CAV Osp. Bambino Gesù Paediatric Hospital - Unit of Emergency and Admission DEA)
  Poison Control Center of Naples Ph. +39 081 7472870 (CAV Cardarelli hospital-Naples)
  Poison Control Center of Foggia Ph. 800183459 (CAV Az. Hosp. Univ. Foggia)
  Verona Poison Control Centre Ph. 800011858 (Azienda Ospedaliera Integrata Verona)

## 2 SECTION 2: IDENTIFICATION OF HAZARDS

### 2.1 Classification of substance or mixture

The product is classified as a dangerous substance pursuant to the provisions laid down in Regulation (EC) 1272/2008 (CLP) (and subsequent amendments and adjustments). The product requires therefore a safety data sheet in accordance with the provisions of Regulation (EC) 1907/2006 and subsequent amendments.

**Classification and hazard statements Regulation (EC) 1272/2008 (CLP):**

| | |
|---|---|
| Acute Tox. 4 | H302 |
| Skin Corr. 1B | H314 |
| Eye Dam. 1 | H318 |
| STOT SE 3 | H335 |
| Aquatic Acute 1 | H400 |
| Aquatic Chronic 1 | H410 |

The full text of hazard statements (H) is specified in section 16 of this data sheet.

### 2.2 Label elements

Hazard labelling in accordance with Regulation (EC) 1272/2008 (CLP) as amended.

**Hazard signs**

**Warnings: Danger**

**Hazard indications**

| | |
|---|---|
| H302 | Harmful if swallowed. |
| H314 | Causes severe skin burns and eye damage. |
| H335 | May cause respiratory irritation |
| H410 | Very toxic to aquatic life with long lasting effects. |

**Additional Hazard Statements**
None

**Precautionary statements**

| | |
|---|---|
| P273 | Do not release to the environment. |
| P301+P312 | IF SWALLOWED accompanied by sickness: contact a POISON CENTER or a doctor. |
| P303+P361+P353 | IF ON SKIN: Remove all contaminated clothing immediately. Rinse skin with water/shower. |
| P304+P340 | IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing |
| P305+P351+P338 | IF IN EYES: rinse continuously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. |
| P501 | Dispose of the product/container in accordance with national and local regulations. |

Ingredients: Zinc Chloride, Ammonium Chloride

### 2.3 Other dangers

According to the available data, the product does not contain any Candidate List PBT or vPvB or SVHC substances or endocrine disruptors above 0.1%.

## 3 SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

### 3.1 Substances

Not applicable.

### 3.2 Mixtures

| ID | Conc. % p/p | Classification Reg. (CE) 1272/2008 (CLP) |
|---|---|---|
| **ZINC CHLORIDE**<br>CAS NO. 7646-85-7<br>N. EC: 231-592-0<br>Index No: 030-003-00-2<br>N. REACH Registration: 01-2119472431-44-0012 | 25% ≤ C ≤ 38% | Acute Tox. 4 H302,<br>Skin Corr. 1B H314,<br>Aquatic Acute 1, H400 (M=10)<br>Aquatic Chronic 1 H410 M=1<br>STOT SE 3 H335 for C ≥ 5 % |
| **AMMONIUM CHLORIDE**<br>CAS NO. 12125-02-9<br>N. EC: 235-186-4<br>Index No: 017-014-00-8<br>N. REACH Registration: 01-2119489385-24-XXXX | 20% ≤ C ≤ 25% | Acute Tox. 4 H302,<br>Eye Irrit. 2 H319 |

The full text of hazard statements (H) is specified in section 16 of this data sheet.

## 4 SECTION 4: FIRST AID MEASURES

### 4.1 Description of first aid measures

Before any intervention, take care of your own safety.
Protection of rescuers: take appropriate precautions.

Inhalation
Move the subject to fresh air and keep him or her at rest in a position that facilitates breathing. If the irritation persists, consult a doctor.

Contact with the skin
Immediately wash the affected area of skin with plenty of water. Take off contaminated clothing. If the irritation persists, consult a doctor.

Contact with eyes
Rinse immediately and thoroughly with water, opening the eyelids well, for at least 15 minutes. Remove contact lenses, if present. If the irritation persists, consult a doctor.

Ingestion
Rinse the mouth with plenty of water. DO NOT induce vomiting. Never give anything by mouth to an unconscious person unless authorized by your doctor. Consult a doctor immediately.

### 4.2 Main symptoms and effects, both acute and delayed

For symptoms and effects due to contained substances, see Section 11.

### 4.3 Indication of any immediate medical attention or special treatment needed

Follow the instructions given in section 4.1.

## 5 SECTION 5: FIRE-FIGHTING MEASURES

### 5.1 Suitable extinguishing

Suitable means of extinction: All conventional extinguishing media can be used; use media suitable for the surrounding fire.
Unsuitable extinguishing media: No one in particular.

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

The product is non-flammable, non-combustible and non-explosive.
In the event of fire, acidic vapours (hydrochloric acid) may be released due to a rise in temperature.

### 5.3 Recommendations for firefighters

Exposure to combustion products can be a health hazard; do not take action without appropriate protective equipment (acid-resistant clothing, self-contained breathing apparatus or gas mask).
Apply standard fire-fighting procedures. Use jets of water to cool the containers to prevent product decomposition and the development of substances potentially hazardous for health.
Containment of fire extinguishing water, which must be collected and not dispersed into the environment through discharge into the sewers. Dispose of extinguishing water and fire residues in accordance with current regulations.

## 6 SECTION 6: ACCIDENTAL RELEASE MEASURES

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

Act only after wearing protective equipment as described in Section 8 and follow the safe handling and use advice in Section 7.
Keep unprotected persons away.
Ensure sufficient ventilation of the location affected by the leak.
Avoid contact with eyes and skin. Do not inhale vapours or mists.
Stop the leak if there is no risk.

### 6.2 Environmental precautions

Do not dispose of the product into the environment. Prevent the product from being discharged or dispersed into soil, sewers, surface groundwater. In case of pollution, inform the competent authorities in accordance with local laws.

### 6.3 Methods and materials for containment and remediation

Isolate the area and prevent the liquid from flowing into water bodies. Suck up the spilled product in appropriate container. Check Section 10 for possible incompatibilities for container material. Absorb residues with absorbent and neutralising material.
Waste disposal must be carried out in accordance with the provisions of Section 13.
Avoid water contamination during cleaning and disposal.

### 6.4 Reference to other sections

For more information refer to Section 8 on personal protective equipment, Section 7 on use and handling advice, Section 13 on waste disposal.

## 7 SECTION 7: HANDLING AND STORAGE

### 7.1 Precautions for safe handling

#### *7.1.1 Protective measures*

Check the intact state of the containers before handling.
Handle with care.
See Section 8 for personal protective equipment to be used.

#### *7.1.2 Guidance on occupational hygiene*

Keep away from food and drink.
Do not eat, drink or smoke while using the product, in working and storage areas.
Wash hands after handling the product, before the break or after work is finished.
Respect normal personal hygiene.

Avoid contaminating clothing with the product, remove contaminated clothing if necessary.
Remove any contaminated clothing and protective equipment before entering the canteen area.

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

Keep the product in its original containers.
Keep containers closed, in a ventilated place, away from heat and direct sunlight.
Use containers made of acid-proof material (PVC, PE, PP, PVDF).
Keep away from incompatible materials (see Section 10).
Keep away from food or feed and beverages.
Store so as to avoid accidental damage.

### 7.3 Special end-uses

The mixture is used for the surface treatment of metals prior to galvanising.
All uses not expressly indicated are not recommended.

## 8 SECTION 8: EXPOSURE/PERSONAL PROTECTION CONTROLS

### 8.1 Control Parameters

**Occupational Exposure Limit Values**

National Limit Values
Zinc chloride: No national limit for this substance.
Ammonium chloride: No national limit for this substance.

EU Limit Values
Zinc chloride: No EU limit for this substance.
Ammonium chloride: No EU limit for this substance.

**DNEL values**
*Zinc chloride*

| | | Workers | | | | General population | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Effects** | **Acute local** | **Acute systemic** | **Chronic (local)** | **Chronic systemic** | **Acute local** | **Acute systemic** | **Chronic (local)** | **Chronic systemic** |
| ***Route of exposure*** | ***Oral*** | Not required | | | | | No hazards identified | Not required | No hazards identified |
| | ***Inhalation*** | Medium risk (no derived threshold value) | No hazards identified | Medium risk (no derived threshold value) | No hazards identified | Medium risk (no derived threshold value) | No hazards identified | Medium risk (no derived threshold value) | No hazards identified |
| | ***Skin*** | Medium risk (no derived threshold value) | No hazards identified | Medium risk (no derived threshold value) | No hazards identified | Medium risk (no derived threshold value) | No hazards identified | Medium risk (no derived threshold value) | No hazards identified |
| | ***Eyes*** | Local effects: Medium risk (no derived threshold value) | | | | Local effects: Medium risk (no derived threshold value) | | | |

*Ammonium chloride*
Long-term systemic effects:

- Dermal exposure - Workers
  - DNEL = 128.9 mg/kg bw/day

- Inhalation exposure - Workers
  - DNEL = 33.5 mg/m3
- Dermal exposure - Population (consumers)
  - DNEL = 55.2 mg/kg bw/day
- Inhalation exposure - Population (consumers)
  - DNEL = 9.9 mg/m3
- Oral exposure - Population (consumers)
  - DNEL = 11.4 mg/kg bw/day

**Biological Limit Values**
Data not available.

**Atmospheric contaminants**
Consider the applicability (for Italy) of Art. 223(1)(d) of Law Decree 81/08 as amended

**PNEC values**

PNEC values for zinc ion

| **Environmental sector** | **PNEC** |
|---|---|
| Fresh water | 14.4 µg/L |
| Freshwater sediments | 146.9 mg/kg sediment (dry weight) |
| Sea water | 7.2 µg/L |
| Seawater sediments | 162.2 mg/kg mg/kg sediment (dry weight) |
| Secondary poisoning | No potential for bioaccumulation |
| Microorganisms in waste water treatment | 100 µg/L |
| Soil (agriculture) | 83.1 mg/kg soil (dry weight) |
| Air | No hazards identified |

PNEC values for zinc chloride

| **Environmental sector** | **PNEC** |
|---|---|
| Fresh water | 30 µg/L |
| Freshwater sediments | 306.2 mg/kg mg/kg sediment (dry weight) |
| Sea water | 15 µg/L |
| Seawater sediments | 338.1 mg/kg mg/kg sediment (dry weight) |
| Secondary poisoning | No potential for bioaccumulation |
| Microorganisms in waste water treatment | 208.4 µg/L |
| Soil (agriculture) | 173.2 mg/kg soil (dry weight) |
| Air | No hazards identified |

PNEC values for ammonium chloride

| **Environmental sector** | **PNEC** |
|---|---|
| Fresh water | 0.25 mg/L |
| Sea water | 0.025 mg/L |
| Freshwater sediments | 0.9 mg/kg |
| Marine sediments | 0.09 mg/kg |
| Soils | 50.7 mg/kg |
| Water Treatment Plant (STP) | 13.1 mg/L |
| Intermittent discharge | 0.43 mg/L |

**Recommended monitoring procedures**
There are exposure limits for the product, so personal, workplace atmosphere and biological monitoring may be required to determine the effectiveness of ventilation or other control measures and/or respiratory protection.
Refer to monitoring standards, such as the following:

- European Standard EN 689 (Atmosphere in the workplace - Guidance on the assessment of inhalation exposure to chemical compounds for comparison with limit values and measurement strategy)
- European Standard EN 14042 (Atmospheres in the workplace - Guide to the application and use of procedures for the assessment of exposure to chemical and biological agents)
- European Standard EN 482 (Atmospheres in the working environment - General requirements for the performance of procedures for measuring chemical agents)

Reference should also be made to national guidance documents on methods for the determination of hazardous substances.

### 8.2 Exposure controls

#### *8.2.1 Suitable technical checks*

Considering that the use of appropriate technical measures should always take priority over personal protective equipment, ensure adequate ventilation in the workplace, where possible installing localised exhaust sources and effective general air exchange systems, except for closed or outdoor processes.
Workplace concentrations must be kept below the stated limit values.
Provide emergency shower and eye wash facilities.
The personal protective equipment should bear the CE marking to certify their compliance with applicable standards.
Observe the usual safety measures when handling chemicals (see Section 7).

#### *8.2.2 Personal protection measures, i.e. personal protective equipment*

Keep away from food, drink. Do not eat, drink or smoke while handling the product.
Wash hands thoroughly before the break or after work is finished.
Take off contaminated clothing.

Hand protection
Wear category III work gloves (ref. standard UNI EN 374). For contact, nitrile rubber gloves are recommended. Recommended material thickness: ≥ 0.11 mm. Value for permeation: ≥ 480 min.
Final selection of glove material must be made taking into account these factors: compatibility, degradation, permeation and time to failure. The process of using the product and any further products resulting from it must also be evaluated. Gloves have a wear time that depends on the duration of exposure and how they are used.

Eye/face protection
Wear safety glasses with side protection (ref. standard UNI EN 166).
If there is a risk of being exposed to splashes or spray in relation to the work performed, adequate face protection (full face shield) must be provided in order to avoid accidental absorption (ref. standard UNI EN 402).

Skin protection
Wear acid-resistant long-sleeved work clothes and category II safety shoes (ref. Legislative Decree no. 475/92 and EN ISO 20344).
In case of necessity (maintenance, emergencies), wear full overalls with acid-proof headgear and rubber boots.

Respiratory protection
In the event of high concentrations in the work environment, wear suitable respiratory protective equipment (mask with filter for acid vapours type B - ref. standard EN 149).
In an emergency, wear self-contained compressed air breathing apparatus (ref. standards EN 137 or 138).

Thermal hazards
The product does not present any thermal hazards, so no special considerations are necessary.
Wear heat-resistant gloves if there are thermal hazards during work.

#### *8.2.3 Environmental exposure controls*

Do not dispose of the product into the environment.
Avoid discharging or dispersing the product or its residues into sewers or surface groundwater.
Emissions from manufacturing processes, including those from ventilation equipment, should be controlled for the purposes of compliance with the rules and regulations on environmental protection.
In the field of environmental protection, consider (for Italy) the applicability of Art. 225, paragraph 2, of Legislative Decree no. 81/08 as amended

## 9 PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on fundamental physical and chemical properties

| | |
|---|---|
| (a) Physical state: | liquid |
| (b) Colour: | transparent |
| (c) Odour: | slightly ammoniacal. No data are available on the olfactory threshold. |
| (d) melting point/freezing point: | no data available |
| (e) Initial boiling point or boiling point and boiling range: | > 110 °C |
| (f) Flammability: | non-flammable |
| (g) Lower and upper explosive limits: | non applicable |
| (h) Flash point: | non applicable |
| (i) Autoignition temperature: | non-flammable |
| (j) Decomposition temperature: | no data available |
| (k) pH: | 3-5 |
| (l) Kinematic viscosity: | not available |
| (m) Solubility: | very soluble<br>(4320 g/l $ZnCl_2$ in water at 25° C, 294 g/l $NH_4Cl$ at 0°C) |
| (n) partition coefficient n-octanol/water (logarithmic value): | not applicable (inorganic mixture) |
| (o) Vapour pressure: | negligible at 20°C |
| (p) Density and/or relative density: | 1.25-1.70 kg/l (relative density) |
| (q) Relative vapor density: | no data available |
| (r) characteristics of the particles: | not applicable (the mixture is liquid) |

### 9.2 Other information

The product contains no chemical groups either associated with explosive or oxidising properties. No other known dangers.

## 10 SECTION 10: STABILITY AND REACTIVITY

### 10.1 Reactivity

The product is non-reactive under normal conditions of use.

### 10.2 Chemical stability

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

### 10.3 Possibility of dangerous reactions

There are no predictable hazardous reaction under normal conditions of use and storage.
Reactions with alkaline compounds.

### 10.4 Conditions to avoid

None in particular. In any case, take the usual precautions when handling chemicals.
It can corrode metals.

### 10.5 Incompatible materials

Alkaline compounds.

### 10.6 Hazardous decomposition products

Gases and vapours potentially harmful to health may be released by thermal decomposition or in the event of fire (acid vapours).

## 11 SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1 Information on the hazard classes defined in Regulation (EC) No. 1272/2008

Acute toxicity
Based on the available data, the criteria for classification as toxic by ingestion are met for the mixture.

*Zinc chloride*

| | Dose/concentration effect | Species | Method/source |
|---|---|---|---|
| **Acute oral toxicity** | $LD_{50}$ 1.100 mg/kg of body weight<br>$LD_{50}$ 1.260 mg/kg of body weight | Rat<br>Mouse | OECD 401 |
| **Acute inhalation toxicity** | $LD_{50}$ < 1.975 mg/m$^3$ | Rat | No guidelines followed |
| **Acute skin toxicity** | $LD_{50}$ > 2.000 mg/kg of body weight | Rat | OECD 402 |

*Ammonium chloride*
LD50 (rat) = 1410 mg/kg (oral) OECD 401

Skin corrosion/skin irritation
Based on the available data, the criteria for classification as corrosive/dermal irritant are met for the mixture.

*Zinc chloride*

| Species | Source | Outcome |
|---|---|---|
| Rabbit, mouse, guinea pig | Lansdown, 1991 | Skin Corr 1B |

*Ammonium chloride*
no skin irritation (rabbit)

Severe eye damage/irritation
Based on the available data, the criteria for classification as an ocular irritant are met.

*Zinc chloride*

| Species | Method | Outcome |
|---|---|---|
| Classification based on skin irritation test results | | Category 1 |

*Ammonium chloride*
irritant to eyes (rabbit)
Causes serious eye irritation.

Respiratory or skin sensitisation
Based on the available data, the criteria for classification as a sensitiser are not met for the mixture.

*Zinc chloride*

| Species | Method | Outcome |
|---|---|---|
| Mouse, guinea pig | LLNA, GPMT | Non-sensitizing |

*Ammonium chloride*
There are no sensitizing effects

Mutagenicity on germ cells
Based on the available data, the criteria for classification as a mutagen are not met for the mixture.

*Zinc chloride*
Based on the existing results of available in vitro and in vivo genotoxicity tests, it is concluded that zinc compounds have no biologically relevant genotoxic activity. Consequently, no classification for germ cell mutagenicity is applicable.
This conclusion is in line with those reached by other regulatory reviews on the genotoxicity of zinc compounds (WHO, 2001; SCF, 2003; EU RAR, 2004, MAK, 2009). Therefore, no classification and labelling for mutagenicity is required.

Carcinogenicity
Based on the available data, the criteria for classification as a carcinogen are not met for the mixture.

*Zinc chloride*
No adequate studies are available to assess the carcinogenicity of zinc compounds for humans.

Reproductive toxicity
Based on the available data, the criteria for classification as a carcinogen are not met for the mixture.

*Zinc chloride*
Fertility impairment and developmental toxicity are not considered endpoints of concern in humans for zinc compounds. Based on the information available in experimental animals and humans, there is no reason to classify any zinc compounds for this hazard class.

Specific toxicity to target organs (STOT) - single exposure
Based on the available data, the mixture is classified as toxic to target organs category 3 (may irritate the respiratory tract).

*Zinc chloride*
Specific concentration limit: STOT SE 3, H335: C≥5%

Specific toxicity to target organs (STOT) - repeated exposure
Based on the available data, the criteria for classification as toxic to target organs - repeated exposure are not met for the mixture.

*Zinc chloride*
No evidence of specific target organ toxicity (repeated oral/inhalatory exposure) for animals or humans. According to the criteria of Regulation (EC) No 1272/2008, none of the zinc compounds are classified for Specific Target Organ Toxicity by Repeated Exposure (STOT-RE).

Aspiration hazard
Based on the available data, the classification criteria for aspiration hazard are not met for the mixture.

Likely routes of exposure
Ingestion, dermal contact.

Effects related to physical, chemical and toxicological characteristics
Exposure symptoms include: burning sensation, coughing, asthmatic breathing, laryngitis, shortness of breath, headache, nausea and vomiting.

Ingestion:
The product is harmful if ingested, and even small amounts ingested can cause significant health problems, including abdominal pain with burning, nausea, vomiting and diarrhoea. Ingestion can cause burns to the mouth, throat and oesophagus, oedema, swelling of the larynx and subsequent suffocation. Perforation of the gastrointestinal tract may also occur.

Contact with skin:
The product is corrosive and causes severe skin burns and blistering, which can also appear after exposure. Burns cause strong burning sensation and pain.

Contact with eyes:
The product will cause serious eye injury and may cause opacity of the cornea, iris lesion, irreversible coloration of the eye. Symptoms may include redness, oedema, pain and lacrimation.

Inhalation:
Inhalation of vapours causes irritation of the lower and upper respiratory tract with coughing and breathing difficulties. At higher concentrations it can also cause pulmonary oedema. Symptoms become manifest sometimes only after a few hours.

Immediate, delayed and chronic effects from short-term and long-term exposure
See above.

Interactive effects
Information not available.

### 11.2 Information on other hazards

The product does not contain any substances with endocrine-disrupting properties in excess of 0.1 % by weight.

## 12 SECTION 12: ECOLOGICAL INFORMATION

The product is to be regarded as environmentally hazardous and has a high toxicity to aquatic organisms with long-term adverse effects on the aquatic environment.
Use in accordance with normal working practices, avoiding dispersion of product in the environment.

When assessing the ecotoxicity of metals in different environmental compartments (aquatic, terrestrial and sediment), it is assumed that toxicity is not controlled by the total concentration of a metal, but by its bioavailable form. For metals, this bioavailable form is generally regarded as the free metal ions. With regard to zinc chloride, it is assumed that the ecotoxicity of zinc compounds is due to the Zn2+ ion.
For zinc compounds, the reference values for ecotoxicity are based on the soluble $Zn^{2+}$ ion and are determined from the extensive data set available from acute and chronic ecotoxicity tests.

### 12.1 Toxicity

***Zinc chloride***
Toxicity to the aquatic environment
The available high-quality data were normalised against two sets of physico-chemical conditions (two different pH ranges). This normalisation is possible because established bioavailability models (so-called 'Biotic Ligand Models' or BLMs) for zinc exist for algae, invertebrates and fish, which allow the prediction of acute and chronic zinc ecotoxicity as a function of the physical-chemical test conditions. The acute aquatic toxicity database on zinc contains data on 59 species (5 algae, 29 invertebrates, 21 fish species, 3 amphibians and 1 aquatic plant). The chronic aquatic toxicity database on zinc contains high-quality data on 41 species (17 taxonomic groups).

*Reference values for ecotoxicity*

| | Parameter | pH | $Zn^{2+}$ ion concentration | Species |
|---|---|---|---|---|
| | NOEC | pH 6 | 154 µg Zn/l | *Daphnia magna* |

| | | | | |
|---|---|---|---|---|
| Acute toxicity | NOEC | pH 8 | 41 µg Zn/l | *Pseudokirchneriella subcapitata* |
| Chronic toxicity | NOEC | pH 6 | 99 µg Zn/l | *Pseudokirchneriella subcapitata* |
| | NOEC | pH 8 | 11 µg Zn/l | *Pseudokirchneriella subcapitata* |

Toxicity to aquatic sediments

| Parameter | Range of values | Data source | PNEC extrapolation method |
|---|---|---|---|
| NOEC/ $EC_{10}$ | 218 to 1101 µg/l | Endpoints for 7 benthic species | Species Sensitivity Distribution (SSD) |

Soil toxicity

| Parameter | Range of values | Data source | PNEC extrapolation method |
|---|---|---|---|
| NOEC/ $EC_{10}$ | 31.2 and 8003.5 mg Zn/kg (dry weight) | Endpoints for 12 terrestrial plants, 10 invertebrates and 13 microbial species | Species Sensitivity Distribution (SSD) |

Toxicity to micro-organisms in waste water treatment plants

| Parameter | Range of values | Data source | PNEC extrapolation method |
|---|---|---|---|
| NOEC | 100 µg Zn/l | Nitrification inhibition test Juliastuti et al. 2003 | Assessment factor AF=1 |

***Ammonium chloride***
Acute toxicity for fish:
LC50 (96 h) = 42.91 mg/l*(Oncorhynchus mykiss)*
LC50 (96 hours) = 46.27 mg/l (Prosopium williamsoni)

Acute toxicity to aquatic invertebrates
EC50 (48 h) = 98.5 mg/l*(Ceriodaphnia dubia*)
EC50 (48 h) = 136.6 mg/l*(Daphnia magna*)

Toxicity on algae/cyanobacteria
EC50 (5 d) = 1300 mg/l*(Chlorella vulgaris*)
EC50 (18 d) = 2700 mg/l(*Chlorella vulgaris*)

Chronic fish toxicity
EC (30 d) = 4.28 mg/l*(Lepomis macrochirus*)

Chronic toxicity to aquatic invertebrates
EC10 (70 d) = 2,52 mg/l

### 12.2 Persistence and degradability

Biodegradation is not applicable to inorganic metals/substances.

### 12.3 Potential for bioaccumulation

Due to homeostatic control mechanisms, bioaccumulation is not relevant for essential elements in general and zinc in particular.

### 12.4 Mobility in the soil

*Zinc chloride*

| Distribution | Type of transport | Parameter | Outcome | Method |
|---|---|---|---|---|
| Soil - water | Adsorption | Log Kp | 3.24 (0.30 – 4.31) | OECD 106 |

### 12.5 PBT and VPvB Assessment Results

Considering what is stated in 12.2. and 12.3. above, zinc and zinc compounds are not PBT or vPvB.

The product does not fulfil the PBT or vPvB criteria according to Annex XIII of Regulation (EC) 1907/2006 (REACH).

### 12.6 Properties of interference with the endocrine system

The product contains no substances with endocrine-disrupting properties.

### 12.7 Other adverse effects

Information not available.

## 13 SECTION 13: DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

Waste management methods must be assessed on a case-by-case basis, in relation to the composition of the waste itself and its hazardousness, in light of the provisions of current EU and national legislation.
For handling and measures in the event of accidental spillage of the waste, the indications given in Sections 6 and 7 apply in general; specific precautions and actions must, however, be evaluated in relation to the composition of the waste.

**PRODUCT**
Product residues should be considered special hazardous waste. The hazard level of waste containing this product should be evaluated according to applicable regulations.
Disposal should be entrusted to an authorized waste management firm, in compliance with national and local regulations.
Waste transportation may be subject to ADR.

**CONTAMINATED PACKAGING**
Contaminated packaging must be recovered or disposed of in compliance with national waste management regulations.
Contaminated packaging must be emptied completely and, after appropriate remediation, may be reused. Reclaim by washing with water.

## 14 SECTION 14: TRANSPORT INFORMATION

The product is considered dangerous according to the applicable regulations for the transport of dangerous goods by road (ADR), by rail (RID), by sea (IMDG Code) and by air (IATA).

Road transport must be carried out by vehicles authorised to transport dangerous goods in accordance with the requirements of the current edition of the ADR Agreement and the applicable national regulations.
Products should be transported in their original packaging and in any case in packages that are made from materials resistant to their content and unlikely to cause dangerous reactions with it. Employees loading and unloading dangerous goods must have received appropriate training on the risks presented by the substance and on any procedures to be adopted in the event of an emergency situation.

### 14.1 UN number or ID number

ADR/RID, IMDG, IATA: 3264

### 14.2 UN proper shipping name

ADR/RID: CORROSIVE INORGANIC LIQUID, ACIDIC, N.O.S.
IMDG: CORROSIVE INORGANIC LIQUID, ACIDIC, N.O.S.
IATA: CORROSIVE INORGANIC LIQUID, ACIDIC, N.O.S.

### 14.3 Transportation hazard classification

ADR/RID, IMDG, IATA: Class: 8 Label : 8


### 14.4 Packing group

ADR/RID, IMDG, IATA: III

### 14.5 Environmental hazards

ADR/RID: Dangerous for the environment:
IMDG: NO
IATA: NO

### 14.6 Special precautions for users

| | | | |
|---|---|---|---|
| ADR/RID: | N. Kemler: 80 | Limited Amounts: 5 L | Code of restriction in tunnels: (E) Special Provision: - |
| IMDG: | EMS: F-A, S-F | Limited Amounts: 5 L | |
| IATA: | Cargo: | Maximum quantity: 450 L | Packaging Instructions: 964 |
| | Passengers: | Maximum quantity: 450 L | Packaging Instructions: 964 |
| | Special instructions: A97, A158 | | |

### 14.7 Transport in bulk according to MARPOL Annex II and the IBC Code

Bulk transport is not carried out.

## 15 SECTION 15: REGULATORY INFORMATION

### 15.1 Laws and regulations on health, safety and the environment specific to the substance or mixture

- EC Regulation 18/12/2006 no. 1907 as amended "Registration, Evaluation, Authorisation and Restriction of Chemicals" (REACH)
- EC Regulation 16/12/2008 no. 1272 as amended "Classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC and Regulation 1907/2006/EC"
- Regulation (EU) 2020/878 of 18 June 2020 amending Regulation No. 1907/2006/EC, concerning Annex II "Requirements for the compilation of safety data sheets (SDS)".
- Legislative Decree no. 9/04/2008-N 81 as amended Implementation of Article 1 of Law no. 123 dated August 3, 2007, concerning the protection of health and safety in the workplace' (for Italy)
- M.D. Labour 26/02/2004 'Definition of a first list of indicative occupational exposure limit values for chemical agents' (for Italy)
- Legislative Decree no. 152/06 as amended "Environmental Regulations" (for Italy)

**Restrictions relating to the product or the contained substances according to Annex XVII of EC Regulation 1907/2006 (REACH) as amended.**
Product related restrictions: 3 (does not apply to product for intended uses)
Information relating to substances contained: 3, 65 (do not apply to substances for the intended use of the product)

**Candidate List Substances (Art. 59 REACH)**
None.

**Substances subject to authorisation (Annex XIV REACH)**
None.

**Substances subject to export notification Reg. (EC) 649/2012 as amended.**
None.

**Substances subject to the Rotterdam Convention**
None.

**Substances subject to the Stockholm Convention**
None.

**Substances subject to the Montreal Protocol**
None.

**Provisions relating to Directive 2012/18/EU (Seveso III), transposed by Law Decree 105/2015**
The product is included for its aquatic hazard properties in Annex 1, Part 1 of Law D. 105/2015 (decree transposing Directive 2012/18/EU - Seveso III), specifically in category E1. Without prejudice to the scope and exclusions in the decree indicated, for storage greater than the quantities indicated in this annex, please refer to Art. 13, 14 or 15 of the aforementioned decree.

**Regulation (EU) 2019/1148 on the marketing and use of explosives precursors**

- Annex I - PRECURSORS OF EXPLOSIVES SUBJECT TO RESTRICTIONS

Product / contained substances: none.

- Annex II - EXPLOSIVE PRECURSORS SUBJECT TO NOTIFICATION

Product / contained substances: none.

**Health Checks**
Workers exposed to chemical agents hazardous to health must undergo health surveillance carried out in accordance with the provisions (for Italy) of Art. 41 of Legislative Decree no. 81 of 9 April 2008, unless the risk to the safety and health of the worker has been assessed irrelevant, in accordance with art. 224 paragraph 2.

### 15.2 Assessment of chemical safety

A chemical safety assessment was carried out for ammonium chloride and zinc chloride.

## 16 SECTION 16: MORE INFORMATION

**Text of hazard indications (H) mentioned in sections 2-3 of this sheet**

| | |
|---|---|
| Acute Tox. 4 | Acute toxicity, category 4 |
| Skin Corr. 1B | Skin corrosion, category 1B |
| Eye Irrit. 2 | Eye irritation, category 2 |
| STOT SE 3 | Specific toxicity to target organs (STOT) - single exposure, category 3 |
| Aquatic Acute 1 | Hazardous to the aquatic environment, acute toxicity, category 1 |
| Aquatic Chronic 1 | Hazardous to the aquatic environment, chronic toxicity, category 1 |
| H302 | Harmful if swallowed. |
| H314 | Causes severe skin burns and eye damage. |
| H319 | Causes serious eye irritation. |
| H335 | May cause respiratory irritation |
| H400 | Very toxic to aquatic organisms. |
| H410 | Very toxic to aquatic life with long lasting effects. |

The classification of the mixture was obtained by means of the calculation methods provided for in Regulation (EC) No. 1272/2008 (CLP Regulation).

**Abbreviations and acronyms**
ACGIH: American Conference of Industrial Hygienists
ADR: European Agreement concerning the transport of dangerous goods by road
CAS NUMBER: Chemical Abstract Service Number
CE NUMBER: Number identifier in ESIS (European database of existing substances)
CLP: Regulation EC 1272/2008
CSR: Chemical Safety Report
DNEL: Derived no-effect level
EC50 or EC50: actual concentration producing 50% of the maximum effect

EmS: Emergency Schedule
EPA Environmental Protection Agency
GHS: Harmonized System overall for the classification and labelling of chemicals
IC50: Concentration of immobilization of 50% of the population subject to test
IATA: Regulation for the transport of dangerous goods of international air transport association
IMDG: International maritime dangerous goods code
IMO: International Maritime Organisation
INDEX NUMBER: Identification number in Annex VI of the CLP
LC50: Lethal Concentration 50%
LD50: lethal dose 50%
NOEC: No observed effect concentration
OEL: Occupational Exposure Level
PBT: Persistent, bioaccumulative and toxic substance according to REACH
PEC: Predicted Environmental Concentration
PEL: Permissible exposure limit
PNEC: Predicted no-effect concentration
REACH: Regulation CE 1907/2006
RID: Regulation on the international carriage of dangerous goods by rail
TLV: threshold Value
TLV CEILING: Concentration that must not be exceeded during any time of the working exposure.
TLV-TWA: Time Weighted Average Exposure Limit
TWA STEL: Short Term Exposure Limit
SCOEL: Scientific Committee on Occupational Exposure Limit Values
UE: European Union
UFI: Unique Formula Identifier
VOC: Volatile organic compound
vPvB: Very persistent and very bioaccumulative according to REACH
WGK: Water hazard class (Germany)

**General bibliography and sources of information**

Regulation (EC) 1907/2006 of the European Parliament (REACH) et seq.
Regulation (EC) 1272/2008 of the European Parliament (CLP) et seq.
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
Agency ECHA website

- Arbejdstilsynet (1992). Grænseværdier for stoffer og materialer. Copenhagen, Denmark, Arbejdstilsynet
- Chemical Safety report (CSR) zinc chloride. 2010.
- Chemical Safety report (CSR) diammonium tetrachlorozincate.. 2010.
- Conner MW, Flood WH and Rogers AE (1988). Lung injury in guinea pigs caused by multiple exposures to ultra fine zinc oxide. Changes in pulmonary lavage fluid. J. Toxicol. Environ. Health 25, 57-69
- Deutsche Forschungsgemeinschaft (DFG): Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe. MAKund BAT-Werte-Liste (1997). Maximale Arbeitsplatzkonzentrationen und biologische Arbeitsstofftoleranzwerte.Weinheim, FRG.
- Domingo J L, Llobet J M, Paternain J L and Corbella J (1988). Acute zinc intoxication: Comparison of the antidotal efficacy of several chelating agents. Vet Hum Toxicol 30(3):224-228.
- Dupont de Nemours and Co (1992). Acute toxicity chemical/physical properties final results. EPA government. Testing laboratory: Report no.: 8EHQ-1092-11302A. Owner company: AND YEARS OLD Dupont de Nemours and Co.
- Dutka BJ, Nyholm N and Petersen J. 1983. Comparison of several microbiological toxicity screening tests. Water research volume 17, nr10, 1363-1368

- European Commission - Joint Research Centre, Institute for Health and Consumer Protection, European Chemicals Bureau (ECB). 2008 were identified. European Union Risk Assessment Report Zinc metal, Volume 42. Final report. (S.J. Munn et al. eds.) 812 pp.
- Gordon T, Chen LC, Fine JM, Schlesinger RB, Su WY, Kimmel TA and Amdur MO (1992). Pulmonary effects of inhaled zinc oxide in human subjects, guinea-pigs, rats, and rabbits. Am. Ind. Hyg. Assoc. J. 53, 503-509.
- Heydon JL and Kagan AN (1990). Metal fume fever. N. Z. Med. J. 103, 52.
- HSE (1998). Health and Safety Executive. Occupational exposure limits 1998. Sudbury, England: HSE Books.
- Hyne R.V., Pablo F, Moreno J; , Markisch S.J. et al 2005. Influence of water chemistry on the acute toxicity of copper and zinc to the cladoceran Ceriodaphnia dubia. Environm. Toxic. & Chemistry 24,1667-1675.
- Ikarashi Y, Tsuchiya T and Nakamura A (1992). Detection of contact sensitivity of metal salts using the murine local lymph node assay. Toxicol. Read 62: 53-61.
- Lam HF, Conner MW, Rogers AE, Fitzgerald S and Amdur MO (1985). Functional and morphologic changes in the lungs of guinea pigs exposed to freshly generated ultra fine zinc oxide. Toxicol. Appl. Pharmacol. 78, 29-38
- Lam HF, Chen LC, Ainsworth D, Peoples S and Amdur MO (1988). Pulmonary function of guinea pigs exposed to freshly generated ultra fine zinc oxide with and without spike concentrations. Am. Ind. Hyg. Assoc. J. 49, 333-341.
- Mueller EJ and Seger DL (1985). Metal fume fever - a review. J. Emerg. Med. 2, 271-274
- National Board of Occupational Safety and Health (1993). Occupational exposure limit values. Solna, Sweden.
- Occupational Safety and Health Administration, OSHA (1989). U.S. Department of Labor.
- SZW (1997). Ministerie van Sociale Zaken en Werkgelegenheid. Nationale MAC-lijst 1997-1998. The Hague, The Netherlands.
- Van Ginneken, 1994. The effect of zinc oxide on the growth of the unicellular green algae Selenastrum capricornutum. Janssen Pharmaceutica Beerse, B. Report AASc/0022, 16-8-1994.
- Van Huygevoort AHBM (1999 i). Assessment of contact hypersensitivity to zinc sulphate heptahydrate in the albino guinea pig (maximisation-test). Project 254328. NOTOX B.V., 's-Hertogenbosch, The Netherlands.
- Karlsson N, Cassel G, Fangmark I & Bergman F (1986). A comparative study of the acute inhalation toxicity of smoke from TiO2-hexachloroethane and Zn-hexachloroethane pyrotechnic mixtures. Arch. Toxicol. 59(3): 160- 166.
- Van Huygevoort AHBM (1999). Primary skin irritation/corrosion study with zinc sulphate heptahydrate in the rabbit (4-hour semi-occlusive application). EU risk assessment report for zinc sulphate, 2004. Testing laboratory: NOTOX B. V., 's-Hertogenbosch, The Netherlands. Report no.: Project 254374.

**Note to the user**

The information contained in the present sheet are based on knowledge achieved on the date of the last version. User must verify the suitability and thoroughness of the information provided 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, the user must, under his own responsibility, comply with the current health and safety laws and regulations. We accept no liability for any unauthorised or improper use. Provide adequate training for personnel assigned to use chemical products.

**Changes made since the previous revision.**

This version no. 09 amends the previous one in sections 3, 8, 11, 12, 16 and adapts the SDS to the provisions of Reg. (UE) 2020/878.