Seiwa Fertilizer Ind. Co., Ltd.

Creation Date : 2019/11/20
Last Revision Date : 2023/4/21

# SAFETY DATA SHEET (SDS)

## 1. IDENTIFICATION

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|---|---|
| **Product name** | ALA GARDEN VFF |
| **Company** | Seiwa Fertilizer Ind. Co.,Ltd. |
| **Address** | 3-4, 4 Chome, Bingo Machi, Chuo-ku, Osaka City |
| **Telephone** | +81-6-6231-3771 |
| **FAX** | +81-6-6231-1988 |
| **Emergency telephone number** | +81-6-6231-3771 |
| **Office hour** | Mon-Fri 9:00-17:00 |
| **Recommended uses and restrictions on use** | Fertilizer |

## 2. HAZARDS IDENTIFICATION

**GHS classification of the substance or mixture**

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|---|---|
| **Physical hazards** | |
| **Corrosive to metals** | Category 1 |
| **Health hazards** | |
| **Skin corrosion/irritation** | Category 2 |
| **Serious eye damage/irritation** | Category 2 |
| **Specific target organ toxicity-single exposure** | Category 3 (respiratory irritation) |
| **Environmental hazards** | Not classified |

**Label elements**

**Pictograms or hazard symbols**

**Signal word** Warning

**Hazard statements**

May be corrosive to metals
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation

**Precautionary statements**

**[Prevention]**

Keep only in original container.
Wash hands and face thoroughly after handling.
Wear protective gloves, protective clothing, face protection.
Do not breathe mist, vapors or spray.
Use only outdoors or in a well-ventilated area.

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| | **[Response]** | Absorb spillage to prevent material damage.<br>IF INHALED : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical advice if needed.<br>IF ON SKIN : Wash off immediately with soap and plenty of water. If skin irritation or rash occurs, get medical advice/attention.<br>IF IN EYES : Rinse cautiously with water for more than 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/ attention.<br>IF SWALLOWED : If feeling unwell, get medical advice/ attention. If vomiting occurs, keep the head lower than chest to avoid aspiration into the lungs. |
| | **[Storage]** | Store in corrosive resistant container with a resistant inner liner. Store locked up. |
| | **[Disposal]** | Observe all federal, state and local regulations when disposing of the substance and container. |
| **Others** | | No information available |
| **Other hazards** | | Irritation to eye, respiratory system, and skin |

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Substance/mixture** Mixture (aqueous solution)

**Chemical Name** Liquid fertilizer

| Chemical Name | ENCS No. | CAS RN | Percent |
|---|---|---|---|
| Urea | 2-1732 | 57-13-6 | <15% |
| Ammonium nitrate | 1-395 | 6484-52-2 | <5% |
| Magnesium nitrate hexahydrate | 1-464 | 13446-18-9 | <25% |
| Phosphoric acid | 1-422 | 7664-38-2 | <10% |
| Potassium hydroxide aqueous solution | 1-454 | 1310-58-3 | <10% |
| Magnesium hydroxid | 1-386 | 1309-42-8 | <1% |
| Manganese (II) sulfate monohydrate | not-disclosed | 10034-96-5 | <1% |
| Sodium tetraborate decahydrate | 1-69 | 1303-96-4 | <1% |
| Chelest FNZ-50 (DTPA Iron diammonium salt solution) | 2-1274<br>1-391 | 85959-68-8 | <10% |
| Zinc (II) sulfate heptahydrate | 1-542 | 7446-20-0 | <0.5% |
| Cupper (II) sulfate pentahydrate | 1-300 | 7758-99-8 | <0.1% |
| Disodium molybdate dihydrate | 1-478 | 10102-40-6 | <0.1% |
| Anhydrous citric acid | 2-1318 | 77-92-9 | <5% |
| Others | | | <3% |

| Components | ENCS No. | CAS RN | Guaranteed components |
|---|---|---|---|
| Total nitrogen (as N) | not-disclosed | not-disclosed | 8.00% |
| Nitrate nitrogen (as N) | not-disclosed | not-disclosed | 2.40% |
| Water soluble phosphorus (as $P_2O_5$) | not-disclosed | not-disclosed | 5.00% |
| Water soluble potassium (as $K_2O$) | not-disclosed | not-disclosed | 3.00% |
| Water soluble magnesium (as MgO) | not-disclosed | not-disclosed | 3.00% |
| Water soluble mangan (as MnO) | not-disclosed | not-disclosed | 0.15% |
| Water soluble boron (as $B_2O_3$) | not-disclosed | not-disclosed | 0.22% |
| Response modifier | | | Content |
| Iron (as Fe) | not-disclosed | not-disclosed | 0.29% |
| Zinc (as Zn) | not-disclosed | not-disclosed | 0.07% |
| Copper (as Cu) | not-disclosed | not-disclosed | 0.01% |
| Molybdenum (as Mo) | not-disclosed | not-disclosed | 0.01% |

## 4.FIRST-AID MEASURES

**Inhalation**
Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical advice if needed.

**Skin contact**
Wash off immediately with soap and plenty of water. If skin irritation or rash occurs, get medical advice/attention.

**Eye contact**
Rinse cautiously with water for more than 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/ attention.

**Ingestion**
If feeling unwell, get medical advice/attention. If vomiting occurs, keep the head lower than chest to avoid aspiration into the lungs.

## 5.FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Water spray, carbon dioxide gas, dry chemical, foam

**Unsuitable extinguishing media**
Straight stream water

**Specific hazards arising from the chemical product**
May release irritable or toxic gas and vapours.

**Special extinguishing method**
Fire-extinguishing work is done from the windward. Entry to non-involved personnel should be controlled around the area. Remove movable containers if safe to do so. Cool the container fully after extinguishing the fire.

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| **Special protective actions for fire-fighters** | Fire-extinguishing work is done from the windward and avoid inhaling harmful gases. Wear respiratory ptotection according to the situation. |

## 6. ACCIDENTAL RELEASE MEASURES

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| **Personal precautions, protective equipment and emergency procedures** | See Section 8. Wear appropriate personal protective equipment to avoid adhering it on skin or in eyes, or inhaling dust. |
| **Environmental precautions** | Avoid release high concentrated products to the environment. |
| **Methods and materials for contaminent and methods and materials for cleaning up** | Stop leakage if safe to do so.<br>No smoking, or eating and drinking when handling. |
| **Secondary disaster prevention measures** | No information available |

## 7. HANDLING AND STORAGE

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| **Handling** | **Technical measures** | See Section 8. Wear appropriate personal protective equipment. Use in a well-ventilated area. Use a ventilation, local exhaust according to the situation. |
| | **Safety handling precautions** | Keep out of contact with alkaline substances, oxidizing agents, and high temperature substances. Wash hands and face after handling. Take off contaminated clothes. Wash them before reusing. No smoking, or eating and drinking when handling. |
| | **Storage conditions** | Store away from sunlight, in a cool, dark, and dry place. Use a sealable container without damage and leakage.Lighting and ventilation equipment necessary for storing or handling dangerous and harmful substances will be installed in the storage location. |
| | **Incompatible substances** | Oxidizing agents, reducing agents, alkaline substances, high temperature substances |
| | **Safe packaging material** | Sealable container without damage and leakage. Keep only in original container. |

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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| **Control parameters** | Not set up |
| **Exposure limits** | |
| **Japan Society for Occupational Health (JSOH) (2022)** | Phosphoric acid : 1 mg/$m^3$<br>Potassium hydroxide : 2 mg/$m^3$ (Exposure limits)<br>Manganese and its compounds (Manganese (II) sulfate monohydrate) : 0.1 mg/$m^3$ (Total dust) |
| **ACGIH** | Phosphpric acid : 1 mg/$m^3$ (TLV-TWA)<br>Phosphpric acid : 3 mg/g3 (TLV-STEL)<br>Potassium hydroxide : 2 mg/$m^3$ (TLV-Celling)<br>Manganese and Manganese Compounds (Manganese (II) sulfate monohydrate) : 0.2 mg Mn/$m^3$ (TLV-TWA)<br>Cupper (II) sulphate : 0.2 mg Cu/m3 (Fume), 1 mg Cu/m3 (Dusts, Mist) |

**Personal protective equipment**

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| **Respiratory protection** | If vapours occur, wear protective mask or respirator. |
| **Hand protection** | Rubber or PVC protective gloves |
| **Eye protection** | Protective glasses - with side plates, or goggles |
| **Skin and body protection** | Protective long sleeve clothing, protective apron |
| **General hygiene considerations** | Wash hands and face after handling.<br>No smoking, or eating and drinking when handling.<br>Take off contaminated clothes. Wash them before reusing. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

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|---|---|
| **Physical state** | Liquid |
| **Form** | Liquid |
| **Color** | Brown |
| **Odour** | Slightly sour odor |
| **pH** | 2.5-2.7 |
| **Flammability** | Nonflammable |
| **Density** | 1.27-1.28 |
| **Solubilities** | |
| **Water** | Soluble |
| **Other solvents** | No data available |
| **Corrosive to metals** | Corrosive |

## 10. STABILITY AND REACTIVITY

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|---|---|
| **Reactivity, chemical stability** | Stable under normal temperatures and pressures. |
| **Possibility of hazardous reactions** | No data available |
| **Conditions to avoid** | Avoid excessive heating and mixing with, or storage close to incompatible materials.<br>Avoid direct sunlight, and store in cool, dark, and dry place. |
| **Incompatible materials** | Oxidizing agents, reducing agents, alkaline substances, high temperature substances. |
| **Hazardous decomposition products** | No data available |

## 11. TOXICOLOGICAL INFORMATION

**Product hazard information**

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|---|---|
| **Acute Toxicity** | No data available |
| **Chronic toxicity** | No data available |
| **Irritation** | Irritation to eyes and skin |
| **Specific target organ toxicity -single exposure** | Inhalation of vapors can cause inflammation of respiratory tract and lungs. |

**Components hazard information**

**Urea**

**Acute Toxicity**

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| **Oral** | Rat : $LD_{50}$=8,471-15,000 mg/kg |
| | Human : Convulsions. Headache. Nausea. Vomiting. |
| **Subcutasubcutaneous / Intravenous route** | Mouse and Rat : Both have low toxicity. |
| **Intratracheal** | Rat : $LD_{50}$=567 mg/kg |
| **Inhalation** | Human : Cough. Shortness of breath. Sore throat. |

**Chronic toxicity**

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|---|---|
| **Oral** | Rat : TDLo 821 g/kg/year (continuous) |
| | Rat : NOAEL about 2,250 mg/kg/day |
| | Mouse : TDLo 394 g/kg/year (continuous) |
| | Mouse : NOAEL about 6,750 mg/kg/day |
| **Subcutaneous and Intravenous Route** | Low toxicity in both mouse and rats. |
| **Skin corrosion / irritation** | No irritation to rabbit and mouse.. |
| | Human : Redness |
| **Serious eye damage / irritaion** | No irritation to rabbit and mouse |
| | Human : Hyperemia |
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No sensitization to human skin |
| **Mutagenicity / Genotoxicity** | Ames test : Negative |
| | Human : intraplacental (pregnant 16 weeks) TDLo=1,600 mg/kg |
| | Monkey : in-utero (pregnant 18 weeks) TDLo = 6,000 mg/kg |
| **Carcinogenicity** | No data available |
| **Reproductive and Developmental toxicity** | No data available |
| **STOT-single exposure** | No data available |
| **STOT-repeated exposure** | No data available |

**Ammonium nitrate**

**Acute Toxicity**

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|---|---|
| **Oral** | Rat : $LD_{50}$=2217, 2462, 2800、2950, 4500, 4820, 5600 mg/kg |
| | Human : Vomiting. Diarrhoea. Blue lips, fingernails and skin. Weakness. |
| **Skin** | No data available |
| **Inhalation** | Rat : $LC_{50}$ > 88.8mg /L (4h) |
| | Rat (males) : 0, 1 mg/m3 6h/d, 5d/w for 4 weeks<br>No significant effects on body weight, lung volume, vital capacity, histologic structure of ciliated epithelial cells of respiratory tract. |
| | Human : Cough. |

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| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | There are several reports of skin irritation tests applied to rabbits for 4 hours, with results of mild irritation or no irritation. After 5 doses in 4 hours, the erythema and edema scores were 0.1 or 0 respectively, and the symptoms were reversible.<br>Human : Redness. |
| **Serious eye damage / irritaion** | In eyes irritation test, corneal opacity, iritis, and conjunctival redness were observed in rabbits treated with 100 mg (99.9% pure). On the other hand, conjunctival redness did not recover after 7 days of application, but recovered completely after 10 days.<br>Human : Redness. Pain. |
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | Chromosome aberration test of mouse bone marrow cells : Negative<br>Ames test : Negative<br>Not expected to be genotoxic *in vivo* . |
| **Carcinogenicity** | No data available |
| **Reproductive and Developmental toxicity** | No data available |
| **STOT-single exposure** | No data available |
| **STOT-repeated exposure** | There is no information regarding this substance. However, the GHS classification result of NITE states that there is a risk of causing methemoglobinemia in humans, especially in neonates. |
| **Other effects on the human body** | It is harmless, but produces harmful nitric oxide and nitrogen dioxide when heated. |

**Magnesium nitrate hexahydrate**

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| **Acute Toxicity** | |
| **Oral** | Rat : $LD_{50}$=5,440 mg/L<br>Human : Abdominal pain, cyanosis of lips, cyanosis of nails and skin, confusion, convulsions, dizziness, headache, nausea, unconsciousness. |
| **Skin** | No data available |
| **Inhalation** | Human : Cough, Sore throat |
| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | Magnesium Nitrate Anhydrous (CAS RN 10377-60-3) is listed by PubChem as potentially causing irritation, redness and pain upon skin contact. But it was not adopted as the evidence of the classification because the reference could not be confirmed. |
| **Serious eye damage / irritaion** | Magnesium nitrate anhydrous (CAS NR 10377-60-3) is described by ICSC as redness and pain. However, GHS classification result of NITE is not adopted because the reference is unknown. |

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| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | No data available |
| **Carcinogenicity** | No data available |
| **Reproductive and Developmental toxicity** | No data available |
| **STOT-single exposure** | There is no information on humans for the substance itself. However, the GHS classification result of NITE states that there is a risk of developing methemoglobinemia. |
| **STOT-repeated exposure** | There is no information regarding this substance. However, the GHS classification result of NITE states that there is a risk of causing methemoglobinemia in humans, especially in neonates. |

**Phosphoric acid**

**Acute Toxicity**

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|---|---|
| **Oral** | Rat : $LD_{50}$=about 2,000 mg/kg, $LD_{50}$=3,500 mg/kg (85%), $LD_{50}$=4,200 mg/kg (80%), $LD_{50}$=4,400 mg/kg (75%)<br>Human : Avoid allcontact. Burns in mouth and throat. Burning sensation behind the breastbone. Abdominal pain. Vomiting. Shock or collapse. |
| **Skin** | Rabbit : $LD_{50}$=1,260 mg/kg (85%), $LD_{50}$=3,160 mg/kg (80%), $LD_{50}$=3,160 mg/kg (75%) |
| **Inhalation (Dusts, Mist)** | Rat : $LC_{50}$ (1h)=3,846mg/$m^3$<br>Human : Cough. Sore thrat. Burning. Sensation. Shortness of breath. Laboured breathing. |
| **Inhalation (Smoke from burning red phosphorus in an air stream)** | Rabbit : $LC_{50}$ (1h)=5,337 mg/$m^3$ (as Phosphoric acid)<br>Rat : $LC_{50}$ (1h)=3,846 mg/$m^3$ (as Phosphoric acid)<br>Mouse : $LC_{50}$ (1h)=856mg/$m^3$ (as Phosphoric acid)<br>Guinea pig : $LC_{50}$ (1h)=193 mg/$m^3$ (as Phosphoric acid) |
| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | As a result of 85% solution of this substance to rabbits, it has been reported that corrosiveness was observed within 4 hours. However, there is a report that no corrosiveness was observed after 4.5 hours of occlusion with a 75% solution. It is also reported that 75% solution causes severe skin burns. This substance is a strong acid and is classified as Irritant I in EPA Pesticide, C; R34 in EU DSD classification, and Skin Corr. 1B H314 in EU CLP classification.<br>Human Redness. Pain. Blisters. Serious skin burns. |
| **Serious eye damage / irritaion** | It is reported that application of this substance (75-85%) to the eyes of rabbits resulted in corrosive.<br>Human Redness. Pain, Severe burns. |
| **Respiratory sensitization** | No data available |

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| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | As for *in vitro* , Negative in both Ames test and chromosomal aberration test in cultured mammalian cells. |
| **Carcinogenicity** | No data available |
| **Reproductive and Developmental toxicity** | Rat : NOAEL 500 mg/kg/day |
| **STOT-single exposure** | Irritating to the respiratory tract in humans and laboratory animals. There are several human cases; Inhalation with severe exposure causes hoarseness, dyspnea, and wheezing (due to laryngeal edema) and in the most severe cases, non-cardiogenic pulmonary edema. It is reported that oral ingestion cause nausea, vomiting, abdominal pain, hemorrhagic diarrhea, esophageal and gastric. |
| **STOT-repeated exposure** | No known adverse effects in humans. In a Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test in rats (males: 42 days, females: 40-52 days), it was non-toxic up to 250 mg/kg/day (90-day equivalent: approximately 117 mg/kg/day), and deaths occurred at 500 mg/kg/day, but the target organ was unknown. |

**Potassium hydroxide**

**Acute Toxicity**

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| **Oral** | Rat : $LD_{50}$=273mg/kg、$LD_{50}$=365mg/kg. |
| | Human : Abdominal pain. Burms in mouth and throat. Burning sensation in the throat and chest. Nausea. Vomiting. Shock or collapse. |
| **Skin** | No data available |
| **Inhalation** | Human : Cough. Sore throat. Burning sensation. Shortness of breath. |
| **Chronic toxicity** | Rat : NOEL>1,820 mg/kg/day |
| | Women : NOEL=88-108 mg/kg/day |
| **Skin corrosion/irritation** | Solid substance is described as corrosive. There are cases of human skin exposure resulting in the III degree chemical burns, and cases of tissue corrosion with small punctures due to battery electrolyte (containing 25% of this substance).<br>In a skin irritation test using rabbits, it is reported that corrosiveness was observed after 4 hours of adaptation to a 10% aqueous solution.<br>This substance is listed as a chemical substance causing skin damage in "Appendix Table1-2, 4-1 of the Ordinance for Enforcement of the Labor Standards Act ; Illness designated by the Minister of Health, Labour and Welfare due to jobs exposed to simple chemical substances or compounds designated by the Minister of Health, Labour and Welfare".<br>Human : Redness. Pain. Serious skin bums. Blisters. |

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| **Serious eye damage / irritaion** | This substance is described as corrosive to the eye at concentrations of 2.0% or higher, and is reported as strongly corrosive (indicated in a 5% aqueous solution for 5 minutes) in an eye irritation test using rabbits. This substance is listed as a chemical substance causing skin damage in "Appendix Table1-2, 4-1 of the Ordinance for Enforcement of the Labor Standards Act; Illness designated by the Minister of Health, Labour and Welfare due to jobs exposed to simple chemical substances or compounds designated by the Minister of Health, Labour and Welfare".<br>Human : Redness. Pain. Blurred vision. Severe burm. |
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | Guinea pig skin sensitization test : Negative |
| **Mutagenicity / Genotoxicity** | As for *in vitro* , genetic toxicity test indicated no evidence for a mutagenic activity.(OECD) |
| **Carcinogenicity** | Concludes in SIDS that there is no evidence that this substance is carcinogenic in humans. |
| **Reproductive and Developmental toxicity** | No reliable data. |
| **STOT-single exposure** | It is described that this substance acts as a strong alkali on the skin and mucosa, inhalation exposure to dust or mist may cause irritation of the upper respiratory tract and tissue damage, and damage of the nasal septum and pulmonary edema may be developed. (NITE) |
| **STOT-repeated exposure** | As for humans, it is noted that damages caused by inhalation of dusts and mists of this substance are mainly inflammation of the upper respiratory tract, and chronic exposures cause ulcers in the nasal septum. Although there is not enough information, this substance is an alkaline substance, and it clearly causes inflammatory effects on the respiratory organs due to inhalation. (NITE) |

**Magnesium hydroxide**

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|---|---|
| **Acute Toxicity** | |
| **Oral** | No data available |
| **Skin** | No data available |
| **Inhalation** | No data available |
| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | No data available |
| **Serious eye damage / irritaion** | No data available |
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | No data available |
| **Carcinogenicity** | No data available |

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| **Reproductive and Developmental toxicity** | No data available |
| **STOT-single exposure** | No data available |
| **STOT-repeated exposure** | No data available |

**Manganese (II) sulfate monohydrate**

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| **Acute Toxicity** | |
| **Oral** | Rat : $LD_{50}$=875.2 mg/kg<br>Rat : No mortality was observed after 14 days of dietary administration of 1,300 mg Mn/kg/day.<br>Human : Sore throat. |
| **Skin** | No data available |
| **Inhalation (Dusts, Mist)** | Human : Cough. Sore throat. Shortness of breath. |
| **Chronic toxicity** | Two-year dietary administration study in rats, 200 mg Mn/kg/day for males, 232 mg Mn/kg/day for females, Males experienced 10% body weight loss, reduced survival rate due to renal impairment and renal failure, and chronic progressive nephropathy, but no toxicity was observed in females. |
| **Skin corrosion / irritation** | In tow skin irritation tests with rabbits according to OECD TG 404, no skin reaction was observed, and the mean scores at 24/48/72 hours were all.<br>Human Redness. |
| **Serious eye damage / irritaion** | In an eye irritation test with rabbits according to OECD TG 405 (only one animal, humanely killed after 7 days), since irreversible symptoms were observed, it was judgeed to be corrosive.<br>Human : Redness. Pain. |
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | As for *in vivo* , there are reports of positive results in a micronucleus test and a chromosomal aberration test with mice bone marrow.<br>As for in vitro there are reports of a negative result in a Ames test and a positive result in a mammalian cell chromosomal aberration test. |
| **Carcinogenicity** | In carcinogenlcity tests in which this substance was administered to rats and mice by feeding for 2 years, as for rats, no increased incidence of tumors was observed in both sexes, and it was judged that there was no evidence of carcinogenicity. On the other hand, as for mice, thyroid gland follicular cell adenoma was observed in males, and follicular cell hyperplasia was observed in females. Therefore, it was conduded that there was equivocal evidence of carcinogenicity. |

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| **Reproductive and Developmental toxicity** | As a result of cross-over mating in which male and famale mice were expoesd to manganese chloride tetrahydrate (CAS RN 13446-34-9) by drinking water for 12 weeks and were mated with unexposed famales and males, respctively, at the dose where decreased drinking water consumption was observed in pasental animals, lower fertility rate in males, and decreases in implantation rate and the number of surviiving fetuses in females, were observed (Food Safty Commision of Japan, Risk Assesment Report (Beverages), 2012).<br>In a test in which maganese chloride (CAS RN 7773-01-5) was administered to pregnant rats by drinking water throughout gestation, an increase in post-implantation embryonic loss in matemal animales, and developmental retardation of the skeleton and internal organs, and an increased of external malformations such as clubfoot in pups, were observed (Food Safty Commision of Japan, Risk Assesment Report (Beverages), 2012). |
| **STOT-single exposure** | No data available |
| **STOT-repeated exposure** | In cases of ingesting well water containing high concentrations of manganese, and in epidemiological studies of residents living in area of high concentrations of manganese, the symptoms like manganese toxicity such as a mask-like face, muscle rigidity, tremors and psychiatric disorders were reported.<br>In factories manufacturing manganese, effects on neurobehavioral function were reported due to exposure to the dust such manganese salts (sulfates, carbonates, nitrates). |

**Disodium tetraborate decahydrate**

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| **Acute Toxicity** | |
| **Oral** | Rat : $LD_{50}$=3,494-6,08 mg/kg (396-689 mg B/kg)<br>Human : Nausea, Vomiting. Diarrhoea. Headache. Weakness. Drowsiness. Convulsions. |
| **Inhalation (Dusts, Mist)** | Rat : 4-hour inhalation exposure test $LC_{50}$>2 mg/L<br>Human : Cough. Sore throat. |
| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | Application of 10 mL of a 5% (w/v) aqueous solution to intact and injured skin of guinea pigs and rabbits was irritant as determined after 24 and 72 hours.<br>Dermatitis has been reported in workers exposed to this substance (borax dust) in mine production section and crushing facilities.<br>Human : Redness. |
| **Serious eye damage / irritaion** | There are descriptions that servere irritation was observed in an eye irritation test with rabbits, and that in another test with rabbits, conjunctiva discoloration, blistering, and thickening developed and corneal irritation resolved after 8-21 days.<br>Human : Redness. Pain. |

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|---|---|
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | As for *in vitro* , Ames test and mammalian cell gene mutation tests are both negative. |
| **Carcinogenicity** | Oral administration test in mice and rats for 2 years or throughout life showed no administration-related neoplastic changes. |
| **Reproductive and Developmental toxicity** | Administration of 50 mg B/kg/d for 60 days to male rats reduced fertility for 4 to 5 weeks after administration, after which it recovered to 60-80% of controls. Administration of 100 mg B/kg/d for 60 days completely abolished fertility throughout the 12-week observation period.<br>When 58.5mg B/kg/day was administered to male and female rats for 3 generations, testicular atrophy and decreased ovulation rate were observed, and pregnancy did not occur.<br>Oral administration tests of boric acid (CAS RN 10043-35-3) in mice, rats, and rabbits have shown increased malformations, with a reported NOAEL for developmental toxicity of 750 ppm (9.6 mg B/kg/d) (NEDO). |
| **STOT-single exposure** | Central nervous system. Gastrointestinal tract. Respiratory tract irritation.<br>Sodium borates including this substance dissolve in water to from boric acid at biological pH (CAS RN 10043-35-3).<br>A 77-year-old man accidentally ingested 30 g of boric acid, vomiting, diarrhea, erythema, cyanosis of extremities, acute renal failure, etc., and died 63 hours later.<br>Eleven neonates intake to boric acid-laced milk developed neurological symptoms including vomiting, diarrhea, tremors and convulsions, and five neonates who consumed more than 4.5 g died within 3 days.<br>Single inhalation exposure studies with boric acid or disodium heptoxide tetraboron pentahydrate (CAS RN 12179-04-3) have reported examples such as increased nasal discharge. |
| **STOT-repeated exposure** | In humans, there are respiratory and nervous system effects.<br>In humans, there is a cross-sectional study of 629 workers (26 of whom were women) who worked at a large US borax mining and smelting plant for more than 5 years. Cough, mucus hypersecretion, and chronic bronchitis were significantly increased in nonsmokers, and shortness of breath complaints were significantly increased in workers with a history of smoking. |

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| | Additionally there is a report that 7 neonates (aged 6 to 16 weeks) who used a pacifier to which borax and honey mixture was applied for 4 to 10 weeks convulsions, irritability, diarrhea, vomiting, and the symptoms disapperred with discontinuation of use. |

**Chelest FNZ-50 (DTPA Iron diammonium salt solution)**

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|---|---|
| **Acute Toxicity** | |
| **Oral** | No data available |
| **Skin** | No data available |
| **Inhalation** | No data available |
| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | The manufacturer's SDS for FNZ-50 states that, based on experience, it may irritate the skin and mucous membranes. |
| **Serious eye damage / irritaion** | The manufacturer's SDS for FNZ-50 states that, based on experience, it may irritate the eye. |
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | No data available |
| **Carcinogenicity** | No data available |
| **Reproductive and Developmental toxicity** | Although there is no information about this substance, abortions and malformations of offspring have been reported in mice and rats administered with Ca-DTPA and Zn-DTPA. |
| **STOT-single exposure** | No data available |
| **STOT-repeated exposure** | Although there is no information about this substance, but animal studies (rat, mouce, dog) have reported that continuous administration of Ca-DTPA or Zn-DTPA for 1 to 6 months affects the small intestine, liver, kidneys, and bones. |

**Zinc (II) sulfate heptahydrate**

| | |
|---|---|
| **Acute Toxicity** | |
| **Oral** | Rat : $LD_{50}$=1,710 mg/kg, $LD_{50}$=1,000-2,000 mg/kg<br>Human : TDLo=106 mg/kg<br>Human : Abdominal pain. Diarrhoea. Nausea. Vomiting. |
| **Intravenous** | Rat : LDLo=50 mg/kg |
| **Subcutasubcutaneous** | Rat : LDLo=1.5 mg/kg |
| **Skin** | Rat : $LD_{50}$ > 2,000 mg/kg |
| **Inhalation (Dusts, Mist)** | Human : Cough. Sore throat. Shortness of breath. |
| **Chronic toxicity** | Human : LOAEL=0.60 mg Zn/kg/d |
| **Skin corrosion / irritation** | In rabbits, skin irritation was not observed in any of the test results.<br>Human : Redness. |

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| **Serious eye damage / irritaion** | In rabits, corneal injury, cojunctival redness, chemosis, and discharge were observed.<br>Human : Redness. Pain. Loss of vision. |
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | Coment assay with mice (*in vivo* ) : Positive result (Zinc sulfate anhydrous, CAS RN 18623-80-8).<br>Negative result in all a chromosomal aberration test, a micronucleus test, and a dominant lethal test (no description of anhydrate or hydrate).<br>Ames test : Negative.<br>Chromosome aberration test in cultured mammalian cells : Negative.<br>Gene mutation test in cultured mammalian cells : Positive. |
| **Carcinogenicity** | No data available |
| **Reproductive and Developmental toxicity** | No data available |
| **STOT-single exposure** | In an acute toxicity test (OECD TG 423) with rats by oral administration, 2/6 animals died at 2,000 mg/kg, and macroscopic changes in the gastrointestinal tract such as thickened gastric mucosa and hemorrhagic small intestine were observed in dead animals. |
| **STOT-repeated exposure** | Not enough data available |

**Copper (II) sulfate pentahydrate**

| | |
|---|---|
| **Acute Toxicity** | |
| **Oral** | Rat : $LD_{50}$=481 mg/kg (OECD)<br>Rat : LD50=960 mg/kg (CERI)<br>Mouse : LD50=577 mg/kg (Converted value, CERI)<br>Dog : LDLo=60 mg/kg (Ministry of Enviroument, Japan)<br>Human : Abdominal pain. Burming sensation. Diarrhoea. Nausea. Vomiting. Shock collapse. (ICSCs)<br>Human : LDLo=1,088 mg/kg (Ministry of Enviroument, Japan) |
| **Intraperitoneal** | Mouse : $LD_{50}$=7.2-33 mg/kg<br>Rat : LD50=20 mg/kg |
| **Intravenous** | Mouse : $LD_{50}$=23.3 mg/kg<br>Rat : LD50=48.9 mg/kg |
| **Subcutasubcutaneous** | Rat : $LD_{50}$=43 mg/kg |
| **Skin** | Rat : $LD_{50}$ > 2,000 mg/kg |
| **Inhalation** | Human : Cough. Sore throat. (ICSCs) |
| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | Rabbit : Not skin irritant (OECD).<br>Human : Redness. Pain. (ICSCs) |
| **Serious eye damage / irritaion** | Rabbit : Severe eye irritant (OECD).<br>Human : Pain. Redness. Blurred vision. (ICSCs) |

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| **Respiratory sensitization** | EU B. 26, Mice m/f, 0, 44, 97, 187, 398 and 814 mg Cu/kg/d in males, and 0, 52, 126, 267, 536 and 1058 mg Cu/kg/d in females for 92 days for 7d/week : NOAEL (m)=97.2 mg Cu/kg/d, NOAEL (f)=125.7 mg Cu/kg/d (OECD) |
| **Skin sensitization** | Guinea pig : Not sensitizing (OECD). |
| **Mutagenicity / Genotoxicity** | *In vitro* , Rat / DNA damage test : Positive (CERI) |
| | *In vitro* , Bacteria (*Escherichia coli* , *Bacillus subtilis* ) / Mutation test : Positive (CERI) |
| | *In vivo* , Ames test : Negative |
| | *In vivo* , Mouse / Micronucleus assay : Negative (OECD) |
| | *In vivo* , Mouse bone marrow cells / Micronucleus assay : Positive (CERI) |
| | *In vivo* , Mouse bone marrow cells / Chromosome aberration test : Positive (CERI) |
| **Carcinogenicity** | Not carcinogenic (OECD). |
| **Reproductive and Developmental toxicity** | Multi-generation Rat, 0, 100, 500, 1000, 1500 ppm in diet : NOAEL=1500 ppm (23.6 mg Cu/kg/d) |
| **STOT-single exposure** | In the NITE-GHS classification results, it is described as Category 1 (blood system, liver, nervous system, kidney, respiratory organs). |
| **STOT-repeated exposure** | In the NITE-GHS classification results, it is described as Category 1 (blood system, kidney, respiratory organs) and Category 2 (liver). |

**Disodume molybdate dihydrate**

**Acute Toxicity**

| | |
|---|---|
| **Oral** | Rat : $LD_{50}$=294 mg/kg (Converted value, Ministry of the Environment JAPAN and NITE)<br>Guinea pig : LD50=364 mg/kg (Converted value, Ministry of the Environment JAPAN)<br>Dog : LD50=294 mg/kg (Converted value, Ministry of the Environment JAPAN)<br>Rat : LD50=4,974 mg/kg (Converted value, OECD)<br>Human : Abdominal pain. Nausea. Vomiting. Diaeehoea. (Ministry of the Environment JAPAN and ICSCs) |
| **Skin** | Rat : $LD_{50}$=2,350 mg/kg (Converted value, OECD) |
| **Inhalation** | Rat : $LD_{50}$=2,268 mg/kg (Converted value, OECD) |
| | Human : Aerosols of sodium molybdate irritate the respiratory tract, causing coughing and sore throat. (Ministry of the Environment JAPAN and ICSCs) |
| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | Causes skin irritation. (PubChem)<br>Human : Redness. (ICSCs) |
| **Serious eye damage / irritaion** | Causes serious eye irritation. (PubChem)<br>Human : Redness. (ICSCs) |
| **Respiratory sensitization** | No data available |

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|---|---|
| **Skin sensitization** | It was not sensitizing in guinea pigs. (OECD) |
| **Mutagenicity / Genotoxicity** | *In vivo* , mouse dominant lethal test : Positive (Ministry of the Environment, JAPAN)<br>*In vivo* , micronucleus test in mouse bone marrow cells : Positive (Ministry of the Environment, JAPAN)<br>*In vivo* , yeast to which the metabolic activation system (S9) was not added did not induce gene mutation and gene conversion. (Ministry of the Environment, JAPAN)<br>*In vitro* , Micronucleus test in human lymphocetes : Positive (Ministry of the Environment, JAPAN) |
| **Carcinogenicity** | There is vague evidence of carcinogenicity in male rats and some evidence of male and female mice. (NITE, JAPAN) |
| **Reproductive and Developmental toxicity** | With the addition of this substance, molybdenum at a concentration of 0-0.01% was administered to female rats for 6 weeks. As a result, prolongation of the sexual cycle was noted in more than 0.001%. At the end of 6 weeks of administration, dosed female were mated with unadministered males and administration continued until day 21 of gestation. Concentrations above 0.001% inhibited maternal and fetal weight gain. In addition, decreased number of fetuses, delayed fetuses organ development, and increased embryo resorption were observed. (Ministry of the Environment, JAPAN)<br>This substance (about 0, 2, 8, 14 mg/kg/day) was administered to rats in the diet for 13 weeks, and the males and females were mated. As a result, weight gain was suppressed in males with a dose of 2 mg/kg/day or more and females of 8 mg/kg/day or more. Furthermore, mating administered males with unadministered females did not affect conception, but mating males and females in the same concentration group conception rate reduced in the group of 8 mg/kg/day or more. Also, when a males of pair who did not become pregnant were crossed with unadministered females, the females did not become pregnant and atrophy of the seminiferous tubules of the testes was noted. (Ministry of the Environment, JAPAN) |
| **STOT-single exposure** | Aerosols of sodium molybdate irritate the respiratory tract, causing coughing and sore throat. (Ministry of the Environment JAPAN) |
| **STOT-repeated exposure** | As a result of repeated oral administration of disodium molybdate to female and male rats for 90 days, weight loss was noted in the 60 mg Mo/kg/day group, but was more pronounced in males. Also, slight diffuse hyperplasia of the proximal tubule were found and reversibility was observed. (OECD)<br>This substance was administered in the diet to rats for 13 weeks, atrophy of the seminiferous tubules of the testes was noted in males at 8 mg/kg/day. |

**Anhydrous citric acid**

**Acute Toxicity**

| | |
|---|---|
| **Oral** | Mouse : $LD_{50}$=5,040 mg/kg |
| | Rat : $LD_{50}$=3,000-12,000 mg/kg |
| | Rabbit : Lethal dose=7,000 mg/kg (probably lowest lethal dose) |
| **Intraperitoneal** | Mouse : $LD_{50}$=903 mg/kg |
| | Rat : 290 mg/kg |
| **Intravenous** | Mouse : $LD_{50}$=42 mg/kg |
| | Rabbit : $LD_{50}$=330 mg/kg |
| **Subcutaneous** | Mouse : $LD_{50}$=2,700 mg/kg |
| | Rat : $LD_{50}$=5,500 mg/kg |
| **Inhalation** | Human : Cough. Shorthness of breath. Sore throat. |
| **Chronic toxicity** | No data available |
| **Skin corrosion / irritation** | Rabbit : 500 mg/24h (mild) |
| | Human : Redness. |
| **Serious eye damage / irritaion** | Rabbit : 0.75 mg/24h (severe) |
| | Human : Redness. Pain. |
| **Respiratory sensitization** | No data available |
| **Skin sensitization** | No data available |
| **Mutagenicity / Genotoxicity** | No data available |
| **Carcinogenicity** | No data available |
| **Reproductive and Developmental toxicity** | No data available |
| **STOT-single exposure** | The substance is irritating to the eyes, skin, and respiratory tract. |
| **STOT-repeated exposure** | May cause tooth acid erosion. |

## 12. ECOLOGICAL INFORMATION

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|---|---|
| **Product hazardous information** | No data available |
| **Hazardous to the aquatic environment** | Direct dumping into water systems may lead to eutrophication. |
| **Persistence and degradability** | Not enough information. |
| **Hazardous to the ozone layer** | Not applicable. |

**Components hazardous information**

**Urea**

| | |
|---|---|
| **Hazardous to the aquatic environment** | Fish (Cyprinidae) : $LC_{50}$ > 9,100 mg/L (96 h) |
| | Fish (Tilapia) : $LC_{50}$=22,500 mg/L (96 h) |
| | Crustacea (Water flea Daphnia, *Daphnia magna* ) : $EC_{50}$ > 10,000 mg/L（24 h） |
| | Algae (Green Algae) : TTC > 10,000 mg/L (196 h) |
| **Persistence and degradability** | Readily degradable (BOD=93-98%, 24h) |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Ammonium nitrate**

| | |
|---|---|
| **Hazardous to the aquatic environment** | Fish (*Oncorhynchus tshawytscha* , *Oncorhynchus mykiss* , *Lepomis macrochirus* ) : $LC_{50}$=542-1,756 mg/L (96 h)<br>Crustacea (Water flea Daphnia, *Daphnia magna* ) : LC50=555 mg/L (24 h)<br>Algae (*Scenedesmus quadricauda* ) : EC3=83 mg/L (7 d)<br>Toad (*Bufo americanus* ) : LC50=13.6-39.3 mg/L (96h), from different ponds<br>African clawed frog (*Xenopus laevis* ) : LC50=100.7 mg/L (96h) |
| **Persistence and degradability** | Readily degradable |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Magnesium nitrate hexahydrate**

| | |
|---|---|
| **Hazardous to the aquatic environment** | No data available |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Phosphoric acid**

| | |
|---|---|
| **Hazardous to the aquatic environment** | Fish (Japanese rice fish, *Oryzias latipes* ) : $LC_{50}$ (96h) = 75.1 mg/L (measured) with pH adjustment, pH3.39-4.45<br>Invertebrate (Water flea Daphnia, *Daphnia magna* ) : EC50 (48h) > 376 mg/L (measured) with pH adjustment, pH7.53-7.95<br>Algae (*Pseudokirchneriella subcapitata* ) : EC50 (72h) = 77.9 mg/L (growth rate, measured) without pH adjustment, pH3.40-4.45<br>Algae (*Pseudokirchneriella subcapitata* ) : EC50 (72h) = 32.0 mg/L (Biomass, measured) without pH adjustment, pH5.61-7.48<br><br>The observed toxicity presented by ohosphoric acid for the environment was considered a result of pH effects. |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Potassium hydroxide**

| | |
|---|---|
| **Hazardous to the aquatic environment** | Reliable acute toxicity data are not available. |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Magnesium hydroxide**

| | |
|---|---|
| **Hazardous to the aquatic environment** | No data available |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Manganese (II) sulfate monohydrate**

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|---|---|
| **Hazardous to the aquatic environment , Short term** | Fish (*Agosia chrysogaster*) : $LC_{50}$ (96h) = 130 mg Mn/L (Manganese (II) sulfate, CAS RN 7785-87-7)<br>Shellfish (*Mytilus edulis*) Embryo : EC50 (48h) = 30 mg Mn/L (Manganese (II) sulfate, CAS RN 7785-87-7) |
| **Hazardous to the aquatic environment , Long term** | Rainbow trout (*Oncorhynchus mykiss*) :<br>NOEC (100d)=0.77 mg/L (Manganese (II) sulfate, CAS RN 7785-87-7) |
| **Persistence and mobility** | It is believed that $Mn^{2+}$ is mobile in water and soil, does not bind strongly to soil or organic matter, and does not volatilize into the atmosphere. |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Disodium tetraborate decahydrate**

| | |
|---|---|
| **Hazardous to the aquatic environment** | Fish (Zebra fish, *Danio rerio*) : $LC_{50}$ (96h)=125 mg/L (13.8 mg B/L)<br>Fish (*Limand limanda*) : LC50 (96h) = 74.0 mg B/L<br>Invertebrate (Water flea Daphnia, *Daphnia magna*) : EC50 (24h) = 644 mg/L (71.4 mg B/L)<br>Green argae (*Selenastrum Capricornutum*) : EC50 (96h) = 15.4mg B/L |
| **Bioaccumulation** | Low potential for boron accumulated *in vivo*, boron bioconcentratio is reported to be low. It has also been reported not to bioconcentration in the food chain. |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Chelest FNZ-50 (DTPA Iron diammonium salt solution)**

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|---|---|
| **Hazardous to the aquatic environment** | No data available |
| **Persistence and degradability** | No data available |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Zinc (II) sulfate heptahydrate**

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|---|---|
| **Hazardous to the aquatic environment, Short term** | Fish (Cutthroat trout, *Oncorhynchus clarkii*) : $LC_{50}$ (96h) = 0.061 mg/L (Zinc sulfate, CAS RN 7733-02-0)<br>Fish (Carp, *Cyprinus carpio*) : LC50 (96h) = 0.150 mg Zn/L<br>Crustacean (*Ceriodaphnia dubia*) : LC50 (48h) =0.095 mg/L<br>Crustacean (Shrimp, *Hyalella azteca*) : LC50 (96h) = 0.290 mg Zn/L<br>Shellfish (Physa heterostropha) : LC50 (96h) =0.290 mg Zn/L |
| **Hazardous to the aquatic environment, Long term** | Fish (Flagfish, *Jordanella floridae*) : 100-d NOEC = 0.026mg Zn/L (Zinc chloride)<br>Crustacean (Water flea Daphnia, *Daphnia magna*) : EC50 (21d) = 0.102 mg/L (Zinc chloride)<br>Aquatic plant (*Spirodela polyrhiza*) : 70-d NOEC = 0.654 mg Zn/L |

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| **Persistence and degradability** | No or low accumulation of this substance in the environment |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Copper (II) sulfate pentahydrate**

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|---|---|
| **Hazardous to the aquatic environment, Short term** | Fish (Rainbow trout, *Oncorhynchus mykiss*) : $LC_{50}$ (96h)=0.0138 mg Cu/L<br>Fish (Fathead minnows, *Pimephales promelas*) : $LC_{50}$ (96h)=0.460 mg Cu/L<br>Fish (Bluegill, *Lepomis macrochirus*) : $LC_{50}$ (96h)=0.884 mg Cu/L<br>Fish (Bluegill, *Lepomis macrochirus*) : $LC_{50}$ (96h)=7.34 mg Cu/L<br>Fish (*Cyprinus carpio*) : $LC_{50}$ (96h)=0.300 mg Cu/L<br>Crustacean (Water flea Daphnia, *Daphnia magna*) : $EC_{50}$ (48h)=0.023-0.027 mg Cu/L<br>Algae (*Selenastrum capricornutum*) : $EC_{50}$ (72h)=0.035 mg Cu/L<br>Algae (*Scenedesumus subspicatus*) : $EC_{50}$ (72h)=0.120 mg Cu/L |
| **Hazardous to the aquatic environment, Long term** | Fish (Fathead minnows, *Pimephales promelas*) : NOEC=0.014-0.022 mg Cu/L (11 month) |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Disodume molybdate dihydrate**

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|---|---|
| **Hazardous to the aquatic environment, Short term** | Fish (Rainbow trut, *Oncorhynchus mykiss*) : LC50 (Mortality)=800 mg Mo/L(96h), 1,320 mg Mo/L(96h)<br>Fish (Coho salmon fry, *Oncorhynchus kisutch*) : LC50 (Mortality) > 1,000 mg Mo/L (96h)<br>Crustacean (Water flea Daphnia, *Daphnia magna*) : LC50 (Mortality)=2,847.5 mg Mo/L (48h)<br>Algae (Grenn algae, *Pseudokirchnerie Ill subcapitata*) : EC10 (Growth)=74.3 mg Mo/L (72h), 164 mg Mo/L (72h) |
| **Hazardous to the aquatic environment, Long term** | Fish (Rainbow trut, *Oncorhynchus mykiss*) : NOEC (Mortality, Growth) >= 17.0 mg Mo/L (1 year)<br>Crustacean (Water flea Daphnia, *Daphnia magna*) : NOEC (Reproduction)=49.9 mg Mo/L (21d)<br>Aquatic plant (Common duckweed, *Lemna minor*) : NOEC (Growth)=24.7 mg Mo/L (7d) |
| **Persistence and degradability** | Persistent substance. Low bioaccumulation. (Ministry of the Environment JAPAN, OECD) |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

**Anhydrous citric acid**

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|---|---|
| **Hazardous to the aquatic environment, Short term** | Fish (Bluegill, *Lepomis macrochirus*) : $LC_{50}$ (96h)=1,516 mg/L<br>Fish (Cyprinidae, *Leuciscus idus*) : $LC_{50}$ (96h)=440-760 mg/L (not neutralised)<br>Crustacea (*Daphnia magna*) : $EC_0$=1,206 mg/L, $EC_{50}$=1,535 mg/L, $EC_{100}$=2,083 m/L (neutralised)<br>Crustacea (*Daphnia magna*) : $EC_0$=73 mg/L, $EC_{50}$=85 mg/L, $EC_{100}$=98 mg /L (not neutralised)<br>Crustacea (European green crab, *Carcinus maenas*) : $LC_{50}$ (48h)=160 mg/L<br>Algae (*Scenedesmus quadricauda*) : $EC_0$ (7d)=640 mg/L<br>Algae (*Pavlova lutheri*) : TLC (7d)=1-300 mg/L "saltwater"<br>Bacteria (*Microcystis aeruginosa*) : $EC_0$ (8d)=80mg/L<br>Bacteria (*Nitrosomonas* sp.) : No inhibition on $NH_3$ oxidation at 100 mg/L<br>Bacteria (*Pseudomonas putida*) : $EC_0$ (16h) > 10,000 mg/L<br>Bacteria (*Uronema parduzci*) : TLC=622 mg/L |
| **Hazardous to the aquatic environment, Long term** | Fish (Carassius auratus) : $LC_0$=625 mg/L, $LC_{100}$=894 mg/L "long-time exposure in soft water"<br>Crustacea (Daphnia magna) : $EC_0$=80 mg/L, $EC_{100}$=120 mg/L "long-time exposure in soft water" |
| **Persistence and degradability** | Readily degradable |
| **Hazardous to the ozone layer** | Not listed in the annex to the Montreal Protocol. |

## 13. DISPOSAL CONSIDERATIONS

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| **Waste from residues** | Follow the relevant laws and local disposal regulations. Entrust disposal to and industrial waste contractor or local public body that is authorized by the prefectual governonr where available.<br>Store waste in appropreate condition and do not drain into watercourse. |
| **Contaminated container and contaminated packaging** | Either clean and recycle the containers, or dispose of them suitably according to the relevant laws and regulations, and local disposal regulations. When disposing of empty containers, make sure to discard the contents completely. |

## 14. TRANSPORT INFORMATION

**International regulations**

**ADR/RID**

| | |
|---|---|
| **UN number** | 1760 |
| **Proper shipping name** | CORROSIVE LIQUID, N.O.S. |
| **UN classfication** | 8 |
| **Packing group** | III |

| | |
|---|---|
| **IMDG** | |
| **UN number** | 1760 |
| **Proper shipping name** | CORROSIVE LIQUID, N.O.S. |
| **UN classfication** | 8 |
| **Packing group** | III |
| **Marine pollutant (Sea)** | Not applicable |
| **the IBC code** | Not applicable |
| **ICAO/IATA** | |
| **UN number** | 1760 |
| **Proper shipping name** | CORROSIVE LIQUID, N.O.S. |
| **UN classfication** | 8 |
| **Packing group** | III |
| **Japanese regulations** | |
| **Information on road transport regulation** | Not regulated |
| **Information on marine transport regulation** | Regulated |
| **Marine pollutant substance** | Not regulated |
| **Information on air transport regulation** | Regulated |
| **Emergency Response Guidebook（Yellow-card）** | 154 |
| **Special precautions** | Check the container is not damaged, corroded, or leaked before transported. Avoid direct sunlight. Be careful not to fall, drop, or damage when loading, and ensure not to collapse. Equip the truck and ship with protective equipments (gloves, glasses, masks, etc.), and fire extinguishers, tools necessary for emergency. |

## 15. JAPANESE REGULATORY INFORMATION

The legal and regulatory information is based on the time of preparation of this document. Please check the latest information.

| | |
|---|---|
| **Fertilizer Regulation Act** | Fertilzer- Liquid fertilizer |
| **Industrial Safety and Health Act** | Hazardous and harmful substances whose names, etc. should be notified and displayed :<br>Ammonium nitrate (No content regulation)<br>Phorphoric acid (1 wt% no less than)<br>Potassium hydroxide (1 wt% no less than)<br>Manganese inorganic compound (Manganese sulfate monohydrate, 0.1 wt% no less than)<br>Boron and its sodium salts (Disodium tetraborate decahydrate, 0.1 wt% no less than)<br>Water-soluble iron salts (DTPA Iron diammonium salt solution, 1 wt% no less than)<br>Molybdenum and its compounds (Disodume molybdate dihydrate, 0.1 wt% no less than)<br>Dangerous, Oxidizing substance : Ammonium nitrate<br>Corrosive liquids : Potassium hydroxide solution |

| | |
|---|---|
| **Water Pollution Prevention Act** | Ammonia, Ammonium compounds, Nitrite compounds and Nitrate compounds（Emission standard : 100mg/L (total of ammonium nitrogen x 0.4, nitrite nitrogen and nitrate nitrogen))<br>Boron and its compounds (Emission standard : outside sea area 10 mg/L, sea area 230 mg/L)<br>Zinc and its compounds (Zinc sulfate heptahydrate) |
| **Act on Prevention of Marine Pollution and Maritime Disaster** | Harmful liquid substance（Y Material）:<br>Potassium hydroxide<br>Harmful liquid substance（Z Material) :<br>Urea solution<br>Phosphoric acid<br>Ammonium nitrate solution (Only for concentrations of 93 wt% or less)<br>Magnesium hydroxide |
| **Air Pollution Control Act** | Hazardous air pollutants :<br>Manganese and its compounds (Manganese sulfate monohydrate)<br>Boron compound (Disodium tetraborate decahydrate)<br>Zinc and its compounds (Zinc sulfate heptahydrate)<br>Copper and its compounds (Copper sulfate pentahydrate) |
| **Labor Standards Act** | Occupational disease chemicals :<br>Potassium hydroxide<br>Manganese and its compounds (Manganese sulfate monohydrate) |
| **Chemical Substance Emission Control Promotion Act (PRTR)** | Not applicable |

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Department that wrote : R&D Section