

TECHNICAL DATA SHEET

Section 1: Identification

Product identifier used on the label;

Product name: 28G Galvanized Steel Products
Product code: 28G Galvanized Steel Products_US-1

Other means of identification;

No information

Recommended use of the chemical and restrictions on use;

Recommended use: Underfloor and attic ventilation material (intended to be used outdoors for wooden houses)
Restrictions on use: Uses other than described above are not recommended.

Name, U.S. address, and U.S. telephone number of the chemical manufacturer, importer, or other responsible party;

Name of supplier (importer): Joto-Vent System USA, Inc.
Department in Charge:
Address: 17530 NE Union Hill Rd Suite 240, Redmond, WA 98052
Telephone number: +1-425-256-2210
Fax number:
e-mail address: info@jotovent.com

Name of manufacturer in Japan: Joto Techno Co., Ltd.
Department in Charge Quality Assurance Division
Address Nissei Yodoyabashi East 14F, 3-3-13 Imabashi, Chuo Ku, Osaka City, Osaka, 541-0042 Japan
Telephone number +81-6-6786-8901
Fax number +81-6-6786-8068

Emergency phone number

+1-800-424-9300

Section 2: Hazard Identification

Classification of the chemical in accordance with paragraph (d) of §1910.1200;

The product is an iron alloy and is stable in general environment and has no physical/chemical hazards. Considering generation of dust or fume in working process, the Safety Data Sheet describes hazards of the product as mixture.

Physical Hazards

Classification not possible

Health Hazards

Serious eye damage/eye irritation: Category 2
Respiratory sensitization: Category 1
Skin sensitization: Category 1

Carcinogenicity:	Category 2
Reproductive toxicity:	Category 1
Specific target organ toxicity single exposure:	Category 1 (respiratory organs, kidneys, digestive organ)
Specific target organ toxicity repeated or prolonged exposure:	Category 1 (nervous system, respiratory organs)

Environmental Hazards

Hazardous to the aquatic environment (acute)	Category 2
Hazardous to the aquatic environment (chronic)	Category 2

Other Hazards

No information

Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200;

Symbol(s)



Signal word

Hazard Statement(s)

Danger

May cause an allergic skin reaction.
Causes serious eye irritation.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Suspected of causing cancer.
May damage fertility or the unborn child.
Causes damage to respiratory organs, kidneys, digestive organ.
Causes damage to nervous system, respiratory organs through prolonged or repeated exposure.
Toxic to aquatic life.
Toxic to aquatic life with long lasting effects.

Precautionary Statement(s)

[Prevention]

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/ vapors/spray.
Wash hands thoroughly after handling.
Do not eat, drink or smoke when using this product.
Contaminated work clothing must not be allowed out of the workplace.
Avoid release to the environment.
Wear protective gloves/protective clothing/eye protection/face

protection/hearing protection.
 [In case of inadequate ventilation] wear respiratory protection.
 [Emergency response] If on skin: Wash with plenty of water.
 If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.
 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 If exposed or concerned: Get medical advice/attention.
 Get medical advice/attention if you feel unwell.
 If skin irritation or rash occurs: Get medical advice/attention.
 If eye irritation persists: Get medical advice/attention.
 If experiencing respiratory symptoms: Call a poison center/doctor.
 Take off contaminated clothing and wash it before reuse.
 Collect spillage.
 [Storage] Store locked up.
 [Disposal] Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazards classified under paragraph (d)(1)(ii) of § 1910.1200

- May cause an allergic skin reaction.
- Causes serious eye irritation.
- May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- Suspected of causing cancer.
- May damage fertility or the unborn child.
- Causes damage to respiratory organs, kidneys, digestive organ.
- Causes damage to nervous system, respiratory organs through prolonged or repeated exposure.

Description of any hazards not otherwise classified;

No information

Ingredient with unknown acute toxicity in the mixture

Not applicable

Section 3: Composition/information on ingredients

Compositions (contents of the product)

Chemical name	CAS registry number	Concentration/concentration ranges (wt %)
Carbon	7440-44-0	2.0
Silicon	7440-21-3	1.0
Manganese	7439-96-5	2.0
Molybdenum	7439-98-7	1.0
Copper	7440-50-8	1.0
Nickel	7440-02-0	1.0
Chromium*	7440-47-3	2.0
Zinc	7440-66-6	20
Iron	7439-89-6	60

Aluminum	7429-90-5	10
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Note: The figures shown above are not the specifications of the product.

* Contains trace amounts of hexavalent chromium.

Section 4: First aid measures

Necessary first-aid measures by relevant routes of exposure;

IF INHALED	<p>【Dust, fume and waste generated in the working process】 Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.</p>
IF ON SKIN	<p>【Dust, fume and waste generated in the working process】 Wash contaminated clothing before reuse. Wash with plenty of water and soap. If skin irritation or rash occurs: Get medical advice/attention.</p>
IF IN EYES	<p>【Dust, fume and waste generated in the working process】 Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</p>
IF SWALLOWED	<p>【Dust, fume and waste generated in the working process】 Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.</p>

Most important symptoms/effects, acute and delayed;

- May cause an allergic skin reaction.
- Causes serious eye irritation.
- May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- Suspected of causing cancer.
- May damage fertility or the unborn child.
- Causes damage to respiratory organs, kidneys, digestive organ.
- Causes damage to nervous system, respiratory organs through prolonged or repeated exposure.

Indication of immediate medical attention and special treatment needed, if necessary;

Specific treatment is required.

Section 5: Fire-fighting measures

Suitable (and unsuitable) extinguishing media;

Suitable extinguishing media:

- Use appropriate extinguishing media suitable for surrounding facilities.
- The product is non-flammable.
- If there is a large amount of dust generated by steel processing, etc., use dry sand for asphyxiation and extinguishing.

Unsuitable extinguishing media

- If there is a large amount of dust generated by steel processing, etc., never use water because of the risk

of ignition or explosion.

Specific hazards arising from the chemical;

The product may generate fumes containing metal compounds when melting, cut, or polished.

Special protective equipment and precautions for fire-fighters;

Evacuate non-essential personnel to safe area.

Wear fire/flame resistant/retardant clothing.

Firefighters should wear self-contained breathing apparatus with full face piece operated positive pressure mode.

Section 6: Accidental release measures

Personal precautions, protective equipment, and emergency procedures;

【In case of leakage of dust/waste generated in the working process】

Keep unauthorized personnel away.

Ventilate area until material pick up is complete.

Wear proper protective equipment.

Do not wash away into sewers or waterway.

Avoid raising dust.

Methods and materials for containment and cleaning up;

Sweep up, place in a bag and hold for waste disposal.

Fill the disposal into labelled, closable containers.

Collect spillage.

Section 7: Handling and storage

Precautions for safe handling

Protective measures:

Install appropriate equipment and wear suitable protective apparatus described in "Section 8: Exposure controls/personal protection".

Take precautionary measures against static discharge.

Do not breathe dust/fume generated during the working process.

Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood.

Use only outdoors or in a well-ventilated area.

Wear protective gloves.

Use personal protective equipment as required.

Be careful of personal injury and property damage caused by falling.

【Dust/fume generated in the working process】

Avoid raising dust.

Avoid contact with the skin.

Avoid contact with the eyes.

Prevent deposition of dust.

Avoid exposure to high humidity and contact with incompatible materials.

Advice on general occupational hygiene:

- Do not get in eyes, on skin, or on clothing dust/smoke generated in the working process.
- Wash contaminated parts thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- Contaminated work clothing should not be allowed out of the workplace.
- Take off contaminated clothing and wash it before reuse.
- Wash hands thoroughly after handling.

Conditions for safe storage, including any incompatibilities

Technical measures:

- In the storage area, install adequate light and ventilation systems to handle hazardous materials.

Incompatible materials:

- Acids, Bases, Oxidizing agents should not be mixed with the chemicals.

Conditions for safe storage:

- Store in a dry place.
- Avoid high-temperature materials.
- Keep away from direct sunlight and keep in a dry, cool and dark area.

Packing material:

- Use a sealed container without damage or leakage.

Section 8: Exposure controls/personal protection

Occupational Exposure Limits;

OSHA PEL	15 mg/m ³ (Total dust), 5 mg/m ³ (Respirable fraction) (Molybdenum, Silicon, Aluminum) 5 mg/m ³ (Ceiling limit) (Manganese) 1 mg/m ³ (dust and mist), 0.1 mg/m ³ (fume) (Copper) 1 mg/m ³ (Nickel) 0.5 mg/m ³ (Chromium II, Chromium III) 0.005 mg/m ³ (Chromium IV)
ACGIH TLV-TWA (2025)	0.02 mg/m ³ (R), 0.1 mg/m ³ (I) (Manganese and inorganic compounds, as Mn) (Manganese, fume, as Mn) 3 mg/m ³ (R), 10 mg/m ³ (I) (Molybdenum and insoluble compounds, as Mo) 0.5 mg/m ³ (R) (Molybdenum and soluble compounds, as Mo) 1 mg/m ³ (dust and mist), 0.2 mg/m ³ (fume) (Copper) 1.5 mg/m ³ (I) (Nickel, elemental) 0.2 mg/m ³ (I) (Nickel, insoluble compounds, as Ni) 0.1 mg/m ³ (I) (Nickel soluble compounds, as Ni) 0.5 mg/m ³ (I) (Chromium metal as Cr) 0.003 mg/m ³ (I) (Chromium III inorganic compounds, as Cr (III))

	0.0002 mg/m ³ (I) (Chromium IV inorganic compounds, water-soluble)
	1 mg/m ³ (R) (Aluminum, metal and insoluble compounds)
ACGIH TLV-STEL (2025)	0.0005 mg/m ³ (I) (Chromium IV inorganic compounds, water-soluble)

Appropriate engineering controls;

Do not use in areas without adequate ventilation.

Eye wash station should be available.

Washing facilities should be available.

Individual protection measures, such as personal protective equipment;

Respiratory protection	In case of inadequate ventilation wear respiratory protection.
Hand protection	Wear protective gloves.
Eye protection	Wear safety glasses with side-shields or chemical safety goggles.
Skin and body protection	Wear protective clothing.

Section 9: Physical and chemical properties

Physical state	Solid
Color	Silvery white
Odor (includes odor threshold)	Metallic odor (odorless)
Melting point/freezing point	≥ 1,370°C
Boiling point (or initial boiling point or boiling range)	No information
Flammability	Non-flammable
Lower and upper explosion limit/flammability limit	No information
Flash point	No information
Auto-ignition temperature	No information
Decomposition temperature	No information
pH	No information
Kinematic viscosity	No information
Solubility	Solubility in water: Insoluble Solubility in solvent: Insoluble
Partition coefficient n-octanol/water (log value)	No information
Vapor pressure (includes evaporation rate)	No information
Density and/or relative density	Density: 7 - 9 g/cm ³ Relative density: 7 - 9
Relative vapor density	No information
Particle characteristics	No information

Other information

No information

Section 10: Stability and reactivity

Reactivity

Stable under normal storage/handling conditions.

Chemical stability

Stable under normal storage/handling conditions.

Possibility of hazardous reactions

Contact with water, acids, or other chemicals may generate harmful gases.

Conditions to avoid

Avoid exposure to high humidity and contact with incompatible materials.

Incompatible materials

Acids, Bases, Oxidizing agents should not be mixed with the chemicals.

Hazardous decomposition products

The product may produce fumes containing metal compounds when fused, cut, or polished.

Section 11: Toxicological information

Information on the likely routes of exposure

Inhalation, ingestion, skin and eye contact

Symptoms related to the physical, chemical and toxicological characteristics;

Information on product:

Acute toxicity:	No information
Skin corrosion/irritation:	No information
Serious eye damage/irritation:	No information
Respiratory sensitization:	No information
Skin sensitization:	No information
Germ cell mutagenicity:	No information
Carcinogenicity:	No information
Reproductive toxicity:	No information
Specific target organ toxicity single exposure:	No information
Specific target organ toxicity repeated exposure:	No information
Aspiration hazard:	No information
Other toxicological information	No information

Information on ingredients:

Carbon

Acute toxicity:	No information
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Skin corrosion/irritation:	No information
Serious eye damage/irritation:	No information
Respiratory sensitization:	No information
Skin sensitization:	No information
Germ cell mutagenicity:	No information
Carcinogenicity:	No information
Reproductive toxicity:	No information
Specific target organ toxicity single exposure:	No information
Specific target organ toxicity repeated exposure:	No information
Aspiration hazard:	No information
Other toxicological information	No information

Silicon

Acute toxicity (oral):	Based on a LD ₅₀ value of 3,160 mg/kg bw for rats, the substance was classified into "Not classified" in JIS Classification (corresponding to Category 5 in GHS classification).
Acute toxicity (dermal):	No information
Acute toxicity (inhalation: gases):	Solid as defined in the GHS
Acute toxicity (inhalation: vapors):	No information
Acute toxicity (inhalation: dust/mist):	No information
Skin corrosion/irritation:	No information
Serious eye damage/irritation:	Based on a report of "Slightly irritating" in a rabbit test, the substance was classified into Category 2B.
Respiratory sensitization:	No information
Skin sensitization:	No information
Germ cell mutagenicity:	No information
Carcinogenicity:	No information
Reproductive toxicity:	No information
Specific target organ toxicity single exposure:	Although there is a result that pulmonary epithelial lesions were found in rabbits after intratracheal instillation at 25 mg, classification was not possible due to lack of other sufficient data.
Specific target organ toxicity repeated exposure:	Since no toxic signs or histopathological findings were observed after dietary administration for 1-month at 800 mg/kg to dogs or rats, the substance corresponds to "Not classified" with oral exposure. However, classification was not possible due to lack of or insufficient data with other exposure routes.
Aspiration hazard:	No information
Other toxicological information	No information

Manganese

Acute toxicity (oral):	LD ₅₀ for rats (female): > 2,000 mg/kg
Acute toxicity (dermal):	Classification not possible due to lack of data.
Acute toxicity (inhalation: gases):	Solid as defined in the GHS
Acute toxicity (inhalation: vapors):	Classification not possible due to lack of data.
Acute toxicity (inhalation: dust/mist):	LC ₅₀ for rats (4 hours, dust): > 5.14 mg/L
Skin corrosion/irritation:	<p>It was reported that in an acute dermal irritation/corrosion test in rabbits (n=3) (OECD TG 404, GLP, semi-occlusive, 4-hour application, 72-hour observation), no skin irritation effect was observed (erythema /eschar score: 0/0/0, edema score: 0/0/0). In an <i>in vitro</i> skin irritation test (equivalent to OECD TG 439, GLP, EpiSkin model), the mean cell viability R= 100% (in the range corresponding to "Not classified") was reported.</p>
Serious eye damage/irritation:	<p>It was reported that in an acute eye irritation/corrosion test in rabbits (n=3) (OECD TG 405, GLP, 72-hour observation), the observed effects disappeared within 72 hours (corneal opacity score: 0/0/0, iritis score: 0/0/0, conjunctival redness score: 1/1/1, conjunctival edema score: 1/1/1).</p>
Respiratory sensitization:	Classification not possible due to lack of data.
Skin sensitization:	<p>It was reported that in a local lymph node assay (LLNA) in mice (n=4/group) (OECD TG 429, GLP), the stimulation index (SI value) was 0.79 (2.5%), 1.16 (5%) and 0.73 (10%).</p>
Germ cell mutagenicity:	Classification not possible due to lack of data.
Carcinogenicity:	<p>As classification results by domestic and international organizations, the EPA classified manganese in D (Not Classifiable as to Human Carcinogenicity), and the ACGIH classified manganese and inorganic manganese compounds in A4 (non-classifiable as to their carcinogenicity to humans).</p>
Reproductive toxicity:	<p>Reduced libido, impotence, sexual dysfunction, and reduced sperm quality was reported in men exposed in occupational settings, along with a neurological syndrome known as manganism, although conflicting reports exist.</p> <p>It was reported that an increase in serum prolactin concentration ($p = 0.06$) due to exposure was observed in a survey of a manganese alloy manufacturing plant, and that a significant negative correlation was observed between sperm count and sperm motility and blood manganese concentration in a survey of men who visited a fertility clinic.</p> <p>In experimental animals, decreased conception rate, decreased serum testosterone concentration, decreased sperm count, decreased sperm motility, increased daily sperm production and increases in LH, FSH, and testosterone, and decreased survival rate of newborns immediately after birth were reported after administration of inorganic manganese compounds (mainly by oral dose).</p> <p>In Japan Society For Occupational Health (JSOH), manganese and manganese compounds were classified as reproductive</p>

Specific target organ toxicity single exposure:	<p>toxicity substance Group 2.</p> <p>It was reported that in an acute inhalation toxicity test (dust, 4 hours) with rats, there were no deaths after exposure at 5.14 mg/L (in the range corresponding to "Not classified"), and hunched posture, piloerection, and wet coat were observed during or after exposure.</p> <p>In an acute oral toxicity test with rats, it was reported that there were no deaths or symptoms at 2,000 mg/kg, the upper limit of Category 2 (the upper limit of the range for Category 2).</p>
Specific target organ toxicity repeated exposure:	<p>Exposure to particulate and dust-like forms of manganese was associated with lung irritation and inflammation characterized by macrophage and leukocyte infiltration, phagocytosis of particles, and localized areas of edema in the lungs. There were reports of this not only in occupational settings but also in residential areas near industrial and mining sites. Signs and symptoms included coughing, bronchiolitis, pneumonitis, and decreased pulmonary function.</p> <p>Manganese was deposited in the nasal mucosa, upper respiratory tract, and lungs after inhalation exposure. Particle size was a major determinant of manganese absorption by the inhalation route. Small particles that could enter the lower respiratory tract (respirable fraction: < 5 µm in diameter) were dissolved and absorbed directly into the bloodstream and lymph, whereas large particles that accumulate in the mucosa (inhalable fraction) could enter the olfactory bulb (brain) via olfactory neural connections.</p> <p>High exposure to manganese, which could occur in occupational settings, could result in a clinical neurological lesion called Manganism, characterized by general cognitive and motor dysfunction (slow movement, widespread rigidity, gait disturbance, falls, dystonias, difficulty in walking backwards, and language impairment, etc.). There were also a number of reports suggesting that low exposure to manganese, particularly by inhalation, may result in deterioration of neurofunctional performance, including impairment of fine motor skills, eye-hand coordination, and reaction time. In addition, several epidemiological studies suggested an association between manganese exposure in drinking-water and neurological effects in children.</p> <p>In a 90-day inhalation repeated dose toxicity study of manganese powder with rats (OECD TG 413, GLP), alveolar histiocytosis (dose-dependent) in males and females and increased lung weight in females were observed at ≥ 0.5 µg/L. At ≥ 5 µg/L, small granulomas at the bronchiolo-alveolar junction were observed in males, and at 25 µg/L, alveolitis in males and females, small granulomas at</p>

the bronchiolo-alveolar junction in females, and increased lung weight in males were observed. In addition, changes in the weights of the liver, kidneys and thymus were observed, but they were not accompanied by histopathological changes. Among the above respiratory effects, it was reported that alveolar histiocytosis was not a toxic effect and alveolitis and small granulomas were considered to be toxic findings in response to overloading with particles.

Aspiration hazard:

Classification not possible due to lack of data.

Other toxicological information

No information

Molybdenum

Acute toxicity (oral):

Classification not possible due to lack of data.

Acute toxicity (dermal):

Classification not possible due to lack of data.

Acute toxicity (inhalation: gases):

Solid as defined in the GHS

Acute toxicity (inhalation: vapors):

Solid as defined in the GHS

Acute toxicity (inhalation: dust/mist):

Based on a report that no change was observed after rats were exposed by inhalation to dust of this substance at 25 - 30 mg/L for 1 hour (converted 4-hour equivalent value: 6.25 - 7.50 mg/L), it was classified as "Not classified." Since the test substance was solid, the reference values for dusts and mists were applied.

Skin corrosion/irritation:

Based on a description that it is irritating to human skin, it was classified in Category 2.

Serious eye damage/irritation:

Based on a description that it is irritating to human eyes, it was classified in Category 2.

Respiratory sensitization:

Classification not possible due to lack of data.

Skin sensitization:

Classification not possible due to lack of data.

Germ cell mutagenicity:

Classification not possible due to lack of data.

Carcinogenicity:

In a case-control study of workers working with molybdenum compounds for 21 years or more, as a result of an investigation on the relationship between lung cancer and molybdenum exposures, no relationship was found between lung cancer and the duration of exposure to chromium and mineral oils which were concurrently exposed, an exposure-response relationship was shown only in molybdenum exposure, and an increase in risk of lung cancer by molybdenum exposure was reported for the first time. As for experimental animals, in a carcinogenicity test where rats or mice were exposed to molybdenum trioxide which falls under soluble molybdenum compounds by inhalation for 2 years, increasing trend in incidence of alveolar/bronchiolar adenoma or carcinoma (combined) in male rats, increased incidences of alveolar/bronchiolar carcinoma and alveolar/bronchiolar adenoma or carcinoma (combined) in male mice, increased incidences of alveolar/bronchiolar adenoma and alveolar/bronchiolar adenoma or carcinoma

(combined) in female mice were observed, thus, NTP concluded on the weight of the evidence for carcinogenicity that there was equivocal evidence in male rats and some evidence in female and male mice. The NTP test results about molybdenum trioxide were also described in ACGIH and PATTY, however there is no test report on metallic molybdenum or insoluble molybdenum compounds. As for classification results of carcinogenicity by other organizations, only ACGIH classified soluble molybdenum compounds as "A3", and metallic molybdenum and insoluble molybdenum compounds were not classified by any organization. From the above, this substance was classified as "Classification not possible" due to lack of data.

Reproductive toxicity:

There is no information on the reproductive toxicity of metallic molybdenum or insoluble molybdenum compounds. Therefore, classification was not possible due to lack of data. Besides, as for water soluble molybdenum compounds, as described in this hazard class of sodium molybdate (CAS RN: 7631-95-0), it was classified in Category 2 based on test data in experimental animals.

Specific target organ toxicity single exposure:

Based on a description that this substance is irritating to the respiratory tract, it was classified in Category 3 (respiratory tract irritation).

Specific target organ toxicity repeated exposure:

Classification not possible due to lack of data.

In humans, there is a report in balance studies wherein 24 girls (aged 7 - 9 years) were given molybdenum orally at an average dose of 75 mg/kg/day, low toxicity of molybdenum was verified, and an increased urinary concentration of molybdenum was the only change. On the other hand, there is a report which attributed gout and an increase in uric acid in a part of Armenia to the high level of molybdenum in soil (molybdenum intake was 10 - 15 mg/day). However, U.S. National Research Council concluded that these involvements were speculative and that molybdenum exposures could not be linked to bone disease or abnormalities of uric acid metabolism. As for occupational exposure, an increase in nonspecific symptoms (weakness, fatigue, headache, anorexia, joint and muscle pains) was reported among mining and metallurgy workers exposed to 60 - 600 mg/m³ molybdenum. On the other hand, in a study carried out in a molybdenum roasting plant exposed at a molybdenum concentration of 9.5 mg/m³, although the molybdenum concentrations in blood and urine, uric acid and ceruloplasmin were increased, no gout-like symptoms were observed.

As for experimental animals, there is no data available.

From the above, in humans, there are several reports, however, no case was obtained where molybdenum exposure and the

effects were evident.

Therefore, it was classified as "Classification not possible" due to lack of data.

Aspiration hazard:

Classification not possible due to lack of data.

Other toxicological information

No information

Copper

Acute toxicity (oral):

Classification not possible due to lack of data.

Acute toxicity (dermal):

Classification not possible due to lack of data.

Acute toxicity (inhalation: gases):

Solid as defined in the GHS

Acute toxicity (inhalation: vapors):

Solid as defined in the GHS

Acute toxicity (inhalation: dust/mist):

Classification not possible due to lack of data.

Skin corrosion/irritation:

Classification not possible due to lack of data. Besides, it is described in PATTY that contact dermatitis associated with copper has been reported, but few cases of dermatitis caused by copper metal or its compounds occur in the industry.

Serious eye damage/irritation:

Classification not possible due to lack of data.

Respiratory sensitization:

Classification not possible due to lack of data.

Skin sensitization:

It was classified in Category 1A because the Japan Society for Occupational Health (JSOH) classified copper and its compounds as occupational skin sensitizers Group 2.

Germ cell mutagenicity:

Classification not possible due to lack of data.

Carcinogenicity:

It was classified as "Classification not possible" because the U.S. EPA classified it in I. The category was revised according to the revised GHS classification guidance for the Japanese government.

Reproductive toxicity:

Classification not possible due to lack of data.

Specific target organ toxicity single exposure:

From the knowledge in humans in EHC, ACGIH, and ATSDR, respiratory symptoms (respiratory tract irritation) are the main acute toxic signs in the inhalation route. As for oral exposure, it is described that digestive symptoms (nausea, vomiting, abdominal pain, etc.) were observed after the ingestion of drinking-water and others containing high copper concentrations, and there are numerous reports that nausea and vomiting mainly occurred. Other than these, it is reported in EHC that inhalation exposure caused hepatomegaly, but the air levels were very high, and it is described in ATSDR that liver lesions from acute copper poisoning are rare except for specific diseases (Wilson's disease, etc.). Therefore, the liver was not included in the target organs, and it was classified in Category 1 (digestive system), Category 3 (respiratory tract irritation).

Specific target organ toxicity repeated exposure:

It is reported in EHC, DFGOT that repeated oral exposure to copper in humans caused digestive symptoms (nausea, vomiting, abdominal pain, etc.) and liver disorder (hepatic failure, cirrhosis). Because digestive symptoms are nausea,

vomiting, abdominal pain, etc., they cannot be regarded as specific target organ toxicity. Furthermore, hepatic failure is reported in only one case, therefore it was judged impossible to generalize it. From the above, it was classified as "Classification not possible."

Aspiration hazard:

Classification not possible due to lack of data.

Other toxicological information

No information

Nickel

Acute toxicity (oral):

A LD₅₀ value of > 9,000 mg/kg for rats corresponds to "Not classified".

Acute toxicity (dermal):

No information

Acute toxicity (inhalation: gases):

Solid as defined in the GHS

Acute toxicity (inhalation: vapors):

No information

Acute toxicity (inhalation: dust/mist):

Classification not possible due to lack of animal test data. As relevant information, there is a human case report in which an individual died of respiratory distress syndrome 13 days after a 90-minute exposure to a very high concentration of the substance (estimated 382 mg Ni/m³).

Skin corrosion/irritation:

No information

Serious eye damage/irritation:

No information

Respiratory sensitization:

The substance is classified into Category 2 for respiratory tract sensitizer in Japan Society For Occupational Health (JSOH), and as respiratory tract sensitizer by Japanese Society of Occupational and Environmental allergy and DFG. Based on these information, the substance was classified into Category 1.

Skin sensitization:

There are human case reports of eczema, contact dermatitis and positive results in patch tests. In addition, the substance is classified into Category 1 for skin sensitizer by Japan Society For Occupational Health (JSOH), and as a skin sensitizer by Japanese Society of Occupational and Environmental allergy and DFG. Based on the available information, the substance was classified into Category 1.

Germ cell mutagenicity:

Although there is a positive result in an alveolar macrophage chromosomal aberration test by inhalation exposure to tars, the experimental procedures employed are not commonly used. Therefore, classification was not possible due to lack of sufficient data from *in vivo* mutagenicity tests. As relevant information, from *in vitro* mutagenicity tests, there are reports of negative human lymphocyte chromosomal aberration test and human lymphoblast TK6 gene mutation test.

Carcinogenicity:

Based on the classifications of "2B" in IARC, "R" in NTP and "Carcinogenicity. Category 3; R40" in EU classification, the substance was classified into Category 2. Occurrence of carcinoma and sarcoma is reported in inhalation, subcutaneous, intramuscular, intrathoracic and intraperitoneal

	administration tests in rats.
Reproductive toxicity:	Classification not possible due to lack of data. There is a report that when rats were exposed to the substance in drinking water for 7 months before pregnancy and during pregnancy, a slight increase in pre-implantation mortality was found and some cases of malformed fetuses were noted. The rat test data was not used for classification purposes since the test details are unknown.
Specific target organ toxicity single exposure:	In an inhalation (single intratracheal exposure) test in male rats, cytotoxicity in the alveolar epithelial cells was observed at 0.5 mg and higher concentrations. Inhalation exposure of humans induced "alveolar wall damage and edema in alveolar spaces in the lung and marked tubular necrosis in the kidney". Based on the data, the substance was classified into Category 1 (respiratory system, kidney).
Specific target organ toxicity repeated exposure:	It was reported that a high risk of mortality from respiratory disease is found among workers exposed occupationally to nickel oxides and metal nickel at concentrations of 0.04 mg/m ³ and higher. In addition, rhinitis, sinusitis, nasal septal perforations and dysplasia of the nasal mucosa were reported in nickel refinery and nickel plating workers. Based on the data, the substance was classified into Category 1 (respiratory system). In a 13-week inhalation exposure test in rats (OECD TG 413), pulmonary alveolar proteinosis and glaucomatous inflammation in the lung were observed in females, and mononuclear cell infiltration in the lung was observed in males at a concentration of 1 mg/m ³ (0.0001 mg/L), which falls within the guidance value range for Category 1, and higher levels. In a 21-month inhalation exposure test in rats, pleuritis, pneumonia, congestion and edema were observed at a dose level of 15 mg/m ³ (0.015 mg/L) which is within the guidance value range for Category 1. In addition, pneumonia was noted at a dose level of 1 mg/m ³ (0.001 mg/L) in a 6-month inhalation exposure test in rabbits. The substance is classified into T; R48/23 in EU classification.
Aspiration hazard:	No information
Other toxicological information	No information
Chromium	
Acute toxicity (oral):	Classification not possible due to lack of data.
Acute toxicity (dermal):	Classification not possible due to lack of data.
Acute toxicity (inhalation: gases):	Solid as defined in the GHS
Acute toxicity (inhalation: vapors):	Classification not possible due to lack of data.
Acute toxicity (inhalation: dust/mist):	Classification not possible due to lack of data.
Skin corrosion/irritation:	Classification not possible due to lack of data.
Serious eye damage/irritation:	Particles of this substance may cause irritation to the eyes.

Respiratory sensitization:	It was classified in occupational sensitizers to the airway Group 2 by Japan Society For Occupational Health (JSOH).
Skin sensitization:	It was classified in occupational skin sensitizers Group 1 by Japan Society For Occupational Health (JSOH).
Germ cell mutagenicity:	Classification not possible due to lack of data.
Carcinogenicity:	As for classification results by domestic and international organizations, IARC classified metallic chromium and trivalent chromium compounds in Group 3.
Reproductive toxicity:	Since no data exist for this substance (metallic chromium), it was classified as "Classification not possible" due to lack of data.
Specific target organ toxicity single exposure:	This substance may cause upper and lower respiratory tract irritation if inhaled. Aerosols of this substance caused irritation to the upper respiratory tract.
Specific target organ toxicity repeated exposure:	Classification not possible due to lack of data.
Aspiration hazard:	Classification not possible due to lack of data.
Other toxicological information	No information

Zinc

Acute toxicity (oral):	Based on its LD ₅₀ > 2,000 mg/kg for rats (OECD Guideline 401; Initial Risk Assessment Report), the substance was classified into "Not classified".
Acute toxicity (dermal):	No information
Acute toxicity (inhalation: gases):	Solid as defined in the GHS
Acute toxicity (inhalation: vapors):	No information
Acute toxicity (inhalation: dust/mist):	Based on its LC ₅₀ > 5,410 mg/m ³ for rats (OECD Guideline 403; Initial Risk Assessment Report), the substance was classified into "Not classified".
Skin corrosion/irritation:	There is no available data on metallic zinc, but it is described that its effects are similar to those of zinc oxide. Since zinc oxide is not skin irritating, the substance was classified into "Not classified".
Serious eye damage/irritation:	Since the substance has been documented to be slightly irritating, showing such reactions as conjunctival redness and edema in a test using rabbits, it was classified into Category 2B.
Respiratory sensitization:	No information
Skin sensitization:	There is no available data on metallic zinc, but it is described that its effects are similar to those of zinc oxide. Since zinc oxide is not skin irritating, the substance was classified into "Not classified".
Germ cell mutagenicity:	No information
Carcinogenicity:	Due to a lack of epidemiological reports clarifying carcinogenicity, international organizations such as ACGIH,

	IARC, EPA, and NTP have not evaluated the carcinogenicity of zinc and its compounds. Thus, the substance was classified into "Classification not possible" due to lack of data.
Reproductive toxicity:	Since there is no available data on metallic zinc, the substance was classified into "Classification not possible". Zinc is an essential trace element, and a lack thereof induces pathological dysfunctions, such as deficiency disorders and excess disorders including dermatitis, dysgeusia, diarrhea, and anemia. In humans, such cases as significant increase of pregnancy complications and reduced body weight in children born caused by reduced zinc concentration in blood have been reported.
Specific target organ toxicity single exposure:	In a test using rats, mild signs such as piloerection, diarrhea, bradypnea, and blepharospasm were seen, but the doses are unknown. In humans, symptoms such as lung symptoms including dyspnea, dry cough, and metal-fume fever caused by zinc fumes are seen. However, since zinc fumes mainly consist of but zinc oxides rather than metallic zinc, these symptoms are suggested to be caused by zinc oxides. Thus, the substance was classified into "Classification not possible" due to lack of data.
Specific target organ toxicity repeated exposure:	It is documented that in humans, after exposure at 124 mg/m ³ /50 months, cough and dyspnea (affecting the lungs and chest parts), after exposure at 2.4 mg/m ³ /5 years, normocytic anemia, and effects on bilirubin and cholesterol, and after exposure at 70 mg/kg/10 weeks, hematological changes and enzyme inhibition were observed. However, since the document does not provide levels of symptoms and due to lack of data, the substance was classified into "Classification not possible". As relevant information, zinc is an essential trace element, and a lack thereof induces pathological dysfunctions, such as deficiency disorders and excess disorders including dermatitis, dysgeusia, diarrhea, and anemia.
Aspiration hazard:	No information
Other toxicological information	No information
Iron	
Acute toxicity:	No information
Skin corrosion/irritation:	No information
Serious eye damage/irritation:	No information
Respiratory sensitization:	No information
Skin sensitization:	No information
Germ cell mutagenicity:	No information
Carcinogenicity:	No information
Reproductive toxicity:	No information

Specific target organ toxicity single exposure:	No information
Specific target organ toxicity repeated exposure:	No information
Aspiration hazard:	No information
Other toxicological information	No information

Aluminum

Acute toxicity (oral):	Classification not possible due to lack of data.
Acute toxicity (dermal):	Classification not possible due to lack of data.
Acute toxicity (inhalation: gases):	Solid as defined in the GHS
Acute toxicity (inhalation: vapors):	Solid as defined in the GHS
Acute toxicity (inhalation: dust/mist):	Classification not possible due to lack of data.
Skin corrosion/irritation:	Classification not possible due to lack of data.
Serious eye damage/irritation:	Classification not possible due to lack of data. Besides, it is written that dust of this substance may cause mild inflammation in eyes.
Respiratory sensitization:	Classification not possible due to lack of data.
Skin sensitization:	Classification not possible due to lack of data.
Germ cell mutagenicity:	Classification not possible due to lack of data. There are no <i>in vivo</i> and <i>in vitro</i> data for metallic aluminum.
Carcinogenicity:	In 1970's, increased incidences of bladder and lung cancers were reported in workers at electrolysis tank of aluminum reduction plants. In IARC, working in the aluminum refining process is related to increased risk of cancers in workers, but it is estimated that the causative substance of cancers is not aluminum itself, but polycyclic aromatic hydrocarbon compounds, known carcinogens, or coal tar pitch volatiles, which are by-products derived from the decomposition of electrodes in the electrolysis tank. As results of following epidemiological studies, some reports suggested a functional disorder of respiratory organs, or non-tumor lesions in respiratory organs by exposure to this substance, but there is no report on carcinogenicity. Therefore, ACGIH classified in A4. From the above, the substance was classified as "Classification not possible" in this hazard class.
Reproductive toxicity:	Due to no information on reproductive toxicity by exposure to this substance, the classification is not possible due to lack of data. Besides, it is reported that in a test in which aluminum chloride or aluminum lactate was dosed in an oral route to pregnant rats during a gestation period, or to neonatal rats on day 5 - 17 after birth, delayed neurobehavioral development or hypoactivity was observed in newborns.
Specific target organ toxicity single exposure:	This substance (dust, powder) is irritating to the respiratory tract. As for humans, inhalation of this substance (dust) could cause lung disorder such as pneumoconiosis (aluminosis). As

for experimental animals, it is reported that in single inhalation exposure to this substance (dust) in rats, no change in pulmonary function but enzymatic and cytological changes in bronchoalveolar lavage fluid were observed at 0.05 mg/L, and microgranuloma development occurred in the lung and hilum lymph nodes (microscopic observation) at 0.2 mg/L. These were observed at doses corresponding to Category 1. From the above, because this substance has effects on the respiratory organs in inhalation exposure, it was classified in Category 1 (respiratory system). Besides, respiratory tract irritation was included in effects on the respiratory organs. By adding new information, the previous classification was revised.

Specific target organ toxicity repeated exposure:

As for humans, in an epidemiological survey of 1,142 workers related to manufacturing aluminum and its compounds (1975 - 1981), effects on lung function were observed in exposure to dust of high concentration ($> 100 \text{ mg/m}^3$ -year as total dust), and in chest X-ray examination, small and irregular nodes were reported in a lower part of the lung in 7 - 8%.

As for experimental animals, there is no test report using this substance.

Therefore, the substance was classified in Category 1 (respiratory system).

Besides, as for humans, it is written that decreased cognitive test results were observed, but the clear conclusion was not be drawn. Moreover, it is written that aluminum is not a factor causing Alzheimer's disease at this time, and that in many studies, there is no consistent relationship between aluminum and nervous disorder. Therefore, central nervous system was not included in a target organ.

Aspiration hazard:

Classification not possible due to lack of data.

Other toxicological information

No information

Delayed and immediate effects and also chronic effects from short- and long-term exposure;

May cause an allergic skin reaction.

Causes serious eye irritation.

May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Suspected of causing cancer.

May damage fertility or the unborn child.

Causes damage to respiratory organs, kidneys, digestive organ.

Causes damage to nervous system, respiratory organs through prolonged or repeated exposure.

Numerical measures of toxicity (such as acute toxicity estimates);

Not applicable

Interactive effects

No information

Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition), or by OSHA.;

NTP Report: Not listed

IARC: Listed as Group 2B (Nickel)

OSHA: Not listed

Use of SAR/QSAR/read across

Not applicable

Section 12: Ecological information

Ecotoxicity:

Information on product: No information

Information on ingredients:

Carbon

Aquatic acute toxicity: No information

Aquatic chronic toxicity: No information

Silicon

Aquatic acute toxicity: No information

Aquatic chronic toxicity: No information

Manganese

Aquatic acute toxicity: It was classified in Category 2 from 72-hour $ErC_{50} = 4.5$ mg/L for algae (*Desmodesmus subspicatus*). The classification result was changed from the previous classification by using new information.

Aquatic chronic toxicity: If chronic toxicity data are used, then it is classified as "Not classified" due to insufficient data on rapid degradability and 8-day NOEC = 1.7 mg/L for crustacea (*Ceriodaphnia dubia*). If acute toxicity data are used for a trophic level for which chronic toxicity data are not obtained (algae, fish), then it is classified in Category 2 due to insufficient data on rapid degradability and 72-hour $ErC_{50} = 4.5$ mg/L for algae (*Desmodesmus subspicatus*).

By drawing a comparison between the above results, it was classified in Category 2. The classification result was changed from the previous classification by using new information.

Molybdenum

Aquatic acute toxicity: The classification is not possible because appropriate data are not obtained.

Aquatic chronic toxicity: The classification is not possible because appropriate data are not obtained.

Copper

Aquatic acute toxicity: Classification not possible due to lack of data.
Aquatic chronic toxicity: Classification not possible due to lack of data.

Nickel

Aquatic acute toxicity: No information
Aquatic chronic toxicity: No information

Chromium

Aquatic acute toxicity: Classification not possible due to lack of data.
Aquatic chronic toxicity: Classification not possible due to lack of data.

Zinc

Aquatic acute toxicity: Since its 72h-ErC₅₀ = 0.15 mg/L for algae (*Pseudokirchneriella subcapitata*), the substance was classified into Category 1.
Aquatic chronic toxicity: From acute toxicity Category 1 and for lack of rapid degradability judged from a metal, it was classified in Category 1.

Iron

Aquatic acute toxicity: No information
Aquatic chronic toxicity: No information

Aluminum

Aquatic acute toxicity: The classification is not possible because appropriate data are not obtained.
Aquatic chronic toxicity: No information

Persistence and degradability:

Information on product: No information

Information on ingredients:

Carbon

No information

Silicon

No information

Manganese

No information

Molybdenum
No information

Copper
No information

Nickel
No information

Chromium
No information

Zinc
No information

Iron
No information

Aluminum
No information

Bioaccumulative potential:

Information on product: No information

Information on ingredients:

Carbon
No information

Silicon
No information

Manganese
No information

Molybdenum
No information

Copper
No information

Nickel
No information

Chromium
No information

Zinc

No information

Iron

No information

Aluminum

No information

Mobility in soil:

Information on product:

No information

Information on ingredients:

Carbon

No information

Silicon

No information

Manganese

No information

Molybdenum

No information

Copper

No information

Nickel

No information

Chromium

No information

Zinc

No information

Iron

No information

Aluminum

No information

Other adverse effects:

No information

Section 13: Disposal considerations

Waste treatment methods

Dispose of contents/container in accordance with local/national regulation.

Dispose to an authorized waste collection point.

This material must be disposed of as hazardous waste.

Do not dump into sewers, on the ground or into any body of water.

Section 14: Transport information

UN number Not applicable

UN proper shipping name Not applicable

Transport hazard class(es) Not applicable

Packing group Not applicable

Environmental hazards Not applicable

Transport in bulk according to IMO instruments

Not applicable

Special precautions for user

When transporting, avoid direct sunlight. Confirm no leakage to containers. When loading, prevent containers from falling, dropping off or damaging. Take preventive measures of collapse.

Section 15: Regulatory information

OSHA: Hazardous chemical

TSCA inventory: All ingredients in this product are listed on the TSCA Inventory.

TSCA SNUR: Not listed

SARA Title III: Section 302 (Extremely Hazardous Substances): Not listed
Section 304 (Hazardous Substances): Not listed
Section 313 (TRI Chemicals): Listed (Manganese, Copper, Nickel,
Chromium, Zinc, Aluminum)

CERCLA Reportable Quantity:

5,000 lbs (Copper, Chromium), 100 lbs (Nickel), 1,000 lbs (Zinc)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

Not listed

Clean Water Act (CWA) Section 304(b) Priority Pollutants (40 CFR 423 Appendix A):

Not listed



WARNING: This product can expose you to chemicals including nickel (metallic) which is known to the State of California to cause cancer. In addition, this product can expose you to chemicals including chromium (hexavalent) which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Section 16: Other information, including date of preparation or last revision

Update history:

Date of issue: February 6th, 2026

References:

Information of Joto Techno Co., Ltd.

NITE GHS classification results (<http://www.safe.nite.go.jp/ghs/list.html>). (2025)

ACGIH, American Conference of Governmental Industrial Hygienists (2025) TLVs and BEIs.

[Disclaimer]

This SDS has been prepared based on the best available information however, it may not be sufficient in some cases. It is user's responsibility to modify or update any contents in this SDS regarding information on hazardous properties and/or instruction for safe handling of the product when they become available. Precautionary measures in this SDS are only applicable for normal handling conditions and it is necessary to take appropriate additional measures to ensure safe handling which depend on your specific use conditions or situations.