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Safety Data Sheet

1. Chemical product and company identification

Product name	:	Molybdenum, cube, 5N

Company information

Name of manufacturer	:	KANTO CHEMICAL CO., INC.
Address	:	2-1, Nihonbashi, Muromachi 2-Chome, Chuo-Ku, Tokyo, 103-0022, JP
Name of section	:	Business Administration Department, Reagent Division
Telephone number	:	+81-3-6214-1090
Facsimile number	:	+81-3-3241-1047
Mail address	:	BC32@kanto.co.jp
Reference No	:	26173
Recommended use	:	For research use only
Restrictions on use	:	Seek expert judgment when using the product for applications other than those recommended.

2. Hazards identification

GHS classification

Health hazards	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Specific target organ toxicity (single exposure)	Category 3 (respiratory tract irritation.)

Hazard pictograms

Signal word	:	Warning
Hazard statements	:	Causes skin irritation Causes serious eye irritation May cause respiratory irritation

Precautionary statements

Prevention	:	Avoid breathing dust. Wash hands, forearms and face thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
Response	:	IF ON SKIN: Wash with plenty of water. IF INHALED: 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. Call a POISON CENTER or doctor if you feel unwell. If skin irritation occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.

Storage	:	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	:	Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

3. Composition/information on ingredients

Distinction of substance or mixture : Substance

Chemical name	Concentration (%)	Formula	TSCA	EC-No.	CAS RN
Molybdenum	≥ 99.999	Mo	Listed	231-107-2	7439-98-7

4. First aid measures

First aid measures

First-aid measures after inhalation	:	Remove the victim to fresh air, and make him blow his nose and gargle.
First-aid measures after skin contact	:	Wash the affected areas under running water.
First-aid measures after eye contact	:	Wash the affected areas under running water for at least 15 minutes. If necessary, get medical treatment.
First-aid measures after ingestion	:	Give the victim water or salt water and make him vomit. Get medical attention.
Personal Protection in First Aid and Measures	:	Rescuers should wear proper protective equipment like rubber gloves, goggles.

5. Fire fighting measures

Suitable extinguishing media	:	This product is noncombustible.
Unsuitable extinguishing media	:	None
Firefighting instructions	:	Move containers from fire area if it can be done without risk, if not possible, apply water from a safe distance to cool and protect surrounding area.
Personal protection (Emergency response)	:	Wear breathing apparatus.

6. Accidental release measures

Personal Precautions, Protective Equipment and Emergency Procedures

General measures	:	Wear proper protective equipment and avoid contact with skin and inhalation of dust. Conduct operations from upwind and evacuate people downwind.

Environmental precautions

Environmental precautions	:	Attention should be given to avoid damage to the environment by flowing of spillage to rivers.

Methods and Equipment for Containment and Cleaning up

For containment	:	Sweep up the chemical and place in a chemical waste container.

7. Handling and storage

Handling

Technical measures	:	Wear appropriate protective equipment to avoid contact with skin or inhalation of dust.
Precautions for safe handling	:	Avoid formation of dust and aerosols. Do not allow contact with oxidizing substances.

Storage

Storage conditions	:	Store in a dark, cool place and tightly closed.
Material used in packaging/containers	:	Glass, polyethylene, polypropylene.

8. Exposure controls / Personal protection equipment

ACGIH TWA	10 mg/m³ (I), 3 mg/m³ (R)

Appropriate engineering controls	:	Install a local ventilation system in case of dusty condition.

Protective equipment

Respiratory protection	:	If necessary, wear dust mask
Hand protection	:	Impervious protective gloves
Eye protection	:	Safety goggles
Skin and body protection	:	Protective clothing, protective boots

9. Physical and chemical properties

Physical state	:	Solid
Color	:	Grey
Odor	:	Odorless
pH	:	No data available
Melting point	:	2622 ° C
Freezing point	:	No data available
Boiling point	:	≈ 4825 ° C
Flash point	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Flammability	:	Not flammable.
Vapor pressure	:	No data available
Relative density	:	No data available
Density	:	10.28 g/cm³
Relative gas density	:	No data available
Solubility	:	Water: Insoluble.
Partition coefficient n-octanol/water (log Pow)	:	No data available
Explosive limits (vol %)	:	No data available
Viscosity, kinematic	:	No data available
Particle characteristics	:	No data available

10. Stability and reactivity

Reactivity	:	It reacts with fluorine at room temperature to produce molybdenum(VI) fluoride. Combines with carbon monoxide to form molybdenum hexacarbonyl. At 500℃ or higher, it reacts with oxygen to produce molybdenum(VI) oxide.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	May react violently when in contact with oxidizing substances.
Conditions to avoid	:	Light, heat.
Incompatible materials	:	Acids, oxidizing substances.
Hazardous decomposition products	:	Molybdenum oxides.

11. Toxicological information

Acute toxicity (oral)	:	Classification not possible
Acute toxicity (dermal)	:	Classification not possible
Acute toxicity (inhalation)	:	No classification (gas) No classification (vapor) No classification (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, it was classified as "No classification."
Skin corrosion/irritation	:	Causes skin irritation Based on a description that it is irritating to human skin, it was classified into category 2.
Serious eye damage/irritation	:	Causes serious eye irritation Based on a description that it is irritating to human eyes, it was classified into category 2A.
Respiratory sensitization	:	Classification not possible
Skin sensitization	:	Classification not possible
Germ cell mutagenicity	:	Classification not possible
Carcinogenicity	:	Classification not possible 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 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	:	Classification not possible 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, it was classified into category 2 based on test data in experimental animals.

STOT-single exposure	:	May cause respiratory irritation Based on a description that this substance is irritating to the respiratory tract, it was classified into category 3 (respiratory tract irritation).
STOT-repeated exposure	:	Classification not possible In humans, there is a report in balance studies wherein 24 girls 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. 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

12. Ecological information

Ecotoxicity

Aquatic acute	:	Classification not possible
Aquatic chronic	:	Classification not possible

Persistence and degradability

No additional information available

Bioaccumulative potential

No additional information available

Mobility in soil

No additional information available

Hazardous to the ozone layer

Ozone	:	Classification not possible

13. Disposal considerations

Ecological waste information	:	Solidification method : Solidify with cement and bury in a landfill site approved for hazardous waste disposal. Or entrust approved waste disposal companies with the disposal.
Contaminated container and packaging	:	In case of disposal of empty bottles, dispose bottles after removing the content thoroughly.

14. Transport information

International Regulations

Transport by sea(IMDG)

UN-No. (IMDG)	:	Not applicable
Proper Shipping Name (IMDG)	:	Not applicable
Packing group (IMDG)	:	Not applicable
Transport hazard class(es) (IMDG)	:	Not applicable

Air transport(IATA)

UN-No. (IATA)	:	Not applicable
Proper Shipping Name (IATA)	:	Not applicable
Packing group (IATA)	:	Not applicable
Transport hazard class(es) (IATA)	:	Not applicable
Marine pollutant	:	Not applicable

15. Regulatory information

Regulatory information with regard to this substance in your country or region should be examined by your own responsibility.

16. Other information

Data sources : Encyclopaedia Chimica, Kyoritsu Shuppan Co, Ltd. (1963) .
Handbook of dangeroous and hazardous chemicals, Japan Industrial Safety & Health Association. (2000-2001) .
NITE Chemical Risk Information Platform (NITE-CHRIP), National Institute of Technology and Evaluation.

The information contained herein is based on several references and the present state of our knowledge. However the SDS does not always cover all information about the product, handle the product carefully.The information is intended to ordinary usage, in case of particular handlings, conduct appropriate safety measurements.The information herein is only provision of information, and it does not represent a guarantee the properties of the product.The Safety Data Sheet(SDS) is prepared based on JIS Z7253.