



Material Safety Data Sheet

INCOMOND Nickel Chloride

Identification of the substance and companies:

INCOMOND Nickel Chloride

Other names: nickel chloride
nickel chloride hexahydrate

Composition 100% NiCl₂·6H₂O
C.A.S. Number 7791-20-0
UN No. 3288
DG Class: 6.1, packing group III
Hazchem Code: unknown
Use: electroplating or electroless plating

Manufactured by:

Jinco Nonferrous Metals Co., Ltd., China
Under licence from INCO Limited

Physical and Chemical Properties

Green/yellow deliquescent crystals. Slight acidic odour if wet.

Ingredient	Mol. Wt.	pH ⁽¹⁾
NiCl ₂ ·6H ₂ O	237.7	4.3

Viscosity	Not Applicable
Freezing point / freezing range	Not Applicable
Boiling point/ boiling range	Not Applicable
Flash Point	Not Applicable
Autoflammability	Not Applicable
Explosive properties	Not Applicable
Vapour pressure	Not Applicable
Bulk density	0.9 g/cm ³ ⁽²⁾
Solubility cold water	>250 g/l
Solubility hot water	>550 g/l
Partition coefficient	Not Applicable
Other data	Decomposes on heating Anhydrous salt sublimates at 450°C.

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Exposure standard: TLV: 0.1 mg/m³ ⁽⁵⁾ as nickel

Health Effects

Chronic:

- Toxic if swallowed:
- May cause sensitisation by inhalation and skin contact⁽⁷⁾

- Ingestion** Solutions of nickel chloride are toxic and may cause nausea, vomiting and/or diarrhoea.
The LD₅₀, oral, for rats is in the order of 200 mg/kg body weight ⁽³⁾
- Inhalation** Nickel chloride aerosols may cause irritation to the upper respiratory tract and respiratory sensitisation⁽⁴⁾.
- Eye Contact** Nickel chloride aerosols may cause irritation to the eyes.
- Skin Contact** Nickel chloride may cause irritation to the skin and nickel sensitivity that may result in allergies, skin rash and/or asthma.

First Aid Measures

- Ingestion** Drink large quantities of water. Seek medical attention.
- Inhalation** No specific first aid required
- Skin** Wash thoroughly with water. For rashes seek medical advice and provide safety data sheet if possible.
- Eyes** Irrigate eyes thoroughly with water for at least 10 minutes. If discomfort persists, seek medical attention.
- Wounds** Cleanse thoroughly to remove any nickel chloride particles.

Personal Protection

- Do not breathe dust.
- Avoid continuous and intimate contact or frequent repeated contact with nickel chloride.
- Wear a respiratory protective device approved by Australian Standards AS 1716 and AS 1715.
- Wear safety glasses with side shields, goggles or face shield appropriate to the work being done.
- Wear suitable clothing appropriate to the work being done.
- Wear waterproof gloves when there is a likely exposure of the hands to nickel chloride.
- Wash hands thoroughly after handling and before eating, drinking or smoking.
- Launder clothing and gloves as needed.

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Toxicological Information ⁽⁶⁾

Inhalation: The International Agency for Research on Cancer (IARC) (ref. 4) in 1990 and the U.S. Tenth Report on Carcinogens (ref. 5) in 2002 concluded that there was sufficient evidence that nickel compounds are carcinogenic to humans. In 1999 Toxicology Excellence for Risk Assessment (TERA) found that carcinogenic risk from soluble nickel compounds via inhalation could not be determined because the existing evidence was composed of conflicting data.

Epidemiological studies of Norwegian nickel refinery workers showed that an increased risk of respiratory cancer was present in electrolysis plant workers. These workers had mixed exposure to aerosols of nickel sulfate and nickel chloride and to insoluble forms of nickel. Electrolysis plant workers in an Ontario refinery similarly exposed to nickel sulfate and nickel chloride aerosols, but not the dust from matte roasting operations, did not show any increased incidence of respiratory cancer.

There is no evidence from animal studies that soluble nickel compounds are carcinogenic by relevant routes of exposure.

Exposure to aerosols of nickel chloride causes irritation of the upper respiratory tract and may cause asthma.

Skin Contact: Prolonged and intimate contact with aerosols and solutions of nickel chloride can cause skin irritation, nickel sensitivity and allergic skin rashes.

Eye Contact: May cause irritation.

Ingestion: Ingestion of relatively large doses of solutions of nickel chloride may cause nausea, vomiting and diarrhea. The U.S. Food and Drug Administration has affirmed that nickel is generally recognized as safe (GRAS) as a direct human food ingredient. The U.S. National Institute for Occupational Safety and Health concluded that there is no evidence that nickel and its inorganic compounds are carcinogenic by route of ingestion.

Preexisting Conditions: Skin contact can cause an allergic rash and/or asthma in previously sensitized individuals.

Reproductive Toxicity: Animal experiments indicate that soluble nickel ingestion causes adverse effects on fetal development at a threshold oral exposure of 2.2 mg/ Ni/kg/day by pregnant rats. Data are insufficient to determine if this effect occurs in humans and no regulatory agency has classified soluble forms of nickel as reproductive risks for humans.

Fire Fighting Measures

Non-flammable. May evolve toxic chlorine containing gases if involved in a fire. Extinguish surrounding fires with appropriate methods.

Engineering controls

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- Ventilation is normally required when handling or using this product to keep airborne nickel below the TLV of 0.1 mg/m³ (as nickel)
- Floors, curbs and drains should be designed with clean up in mind and to have any liquid clean up material being directed to water treatment facilities.
- Portable vacuum cleaners and mechanical floor sweepers should be equipped with a high efficiency particulate arresting (HEPA) filter on the vacuum air exhaust.
- Contaminated clean up materials plus water treatment sludge should be collected and accumulated for recovery of nickel values.

Spills

- Wear waterproof gloves and suitable protective clothing.
- Wear appropriate approved respirators if collection and disposal of spills is likely to cause the concentration limits of airborne nickel to exceed the TLV of 0.1 mg/m³ (as nickel).
- Do not allow spills to enter watercourses.
- Collect spills by sweeping or vacuuming with the vacuum exhaust passing through a (HEPA) filter if the exhaust is discharged into the work place.
- Environmental precautions – collect, reclaim and recycle spills.
- Liquid spills should be treated with lime and the solids collected.
- Contaminated clean up materials plus water treatment sludge should be collected and accumulated for recovery of nickel values.

Handling and Storage

Keep in the container supplied and keep container closed when not in use.

Stability and Reactivity

Non-reactive. Stable at ambient temperatures. Can liquefy at temperatures $> \sim 40^{\circ}\text{C}$ as a consequence of water of crystallisation being released from the crystal lattice. At high temperatures, toxic chlorine containing gases may be evolved.

Ecological Information

- Nickel chloride hexahydrate is toxic to green algae, i.e., 1 mg/l $< \text{EC}_{50}/\text{LC}_{50} \leq 10$ mg/l
- Nickel chloride hexahydrate is harmful to water fleas, i.e., 10mg/l $< \text{EC}_{50}/\text{LC}_{50} \leq 100$ mg/l

Transport Information

Nickel chloride is classified as a dangerous good under the international regulations of the “International Maritime Dangerous Goods Code” (IMDG), the “International Civil Aviation Organisation’s Technical Instructions for the Carriage of Dangerous Goods by Air” and by the “Recommendations on the Transport of Dangerous Goods Model Regulations” prepared by the UN Economic and Social Council’s Committee of Experts on the Transport of Dangerous Goods. It is classified as a marine pollutant under the “International Maritime Dangerous Goods Code”

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Under the IMDG Code, the classification of nickel chloride for entry on a shipping document is: TOXIC SOLID, INORGANIC, N.O.S., (nickel chloride), Class 6.1, UN3288, P.G. III, MARINE POLLUTANT.

Notes and Bibliography

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Disclaimer: INCO believes the information in this Material Safety Data Sheet is accurate. However, there is no implied or express warranty as to its accuracy and INCO disclaims any liability resulting from reliance on the accuracy of the information.

1. pH of a 40% solution
2. Bulk density of INCO material.
3. Mastromatteo E.: Nickel Am. Ind. Hyg. Assoc. 47(10) 589-601. 1986
4. Fairhurst S., Illing: H.P.A. The toxicity of nickel and its inorganic compounds.
5. Threshold Limit Values and other information of the American Conference of Governmental Industrial Hygienists. 2003
6. Describes possible health hazards of the nickel product supplied. If user operations change it to other chemical forms, whether as end products, intermediates or fugitive emissions, the user must determine the possible health hazards of such forms.