

MATERIAL SAFETY DATA SHEET

Nickel Sulphate

Product Information

Nickel Sulphate

Synonyms : Nickel (II) Sulphate ; Nickel Sulphate Hexahydrate

Manufactured by :

ZENITH CHEMICAL CORPORATION

Contact Information : Tel 886-4-26811521 ; FAX 886-4-26816523

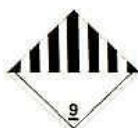
Hazards Identification

GHS :

Health	Environmental	Physical
Acute Toxicity (oral) – Category 3	Aquatic Toxicity – Chronic 1	-----
Acute Toxicity (inhalation) – Category 4	-----	-----
Skin Corrosion / Irritant – Category 3	-----	-----
Respiratory Sensitization – Category 1	-----	-----
Skin Sensitization – Category 1	-----	-----
Carcinogenicity – Category 1A	-----	-----
Reproductive toxicity – Category 2	-----	-----
STOT * Repeated Exposure – Category 2	-----	-----

*- Single Organ Target Toxicity

Symbols : Skull and crossbones, Health Hazard, Environment



Signal Word : Danger

Hazard Statements :

Toxic if swallowed.

Harmful if inhaled.

May cause allergic skin reaction.

Causes damage to lungs through prolonged or repeated inhalation exposure.

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

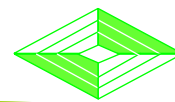
May cause Cancer.

Causes mild skin irritation.

Suspected of damaging fertility or the unborn child.

Very toxic to aquatic life with long lasting effects.

Precautionary Statements :

**Prevention:**

Wash hands and face thoroughly after handling.
Do not eat, drink or smoke when using this product.
Avoid breathing dust, fume, vapours, or spray.
Use only outdoors or in a well-ventilated area.
In case of inadequate ventilation wear approved respiratory protection.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective waterproof gloves and protective clothing.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Use personal protective equipment as required.
Avoid release to the environment.

Response :

IF SWALLOWED : Immediately call a POISON CENTER or doctor/physician.
See First Aid section below for specific treatment.
Rinse mouth.
IF INHALED : Remove to fresh air and keep at rest in a position comfortable for breathing.
Call a POISON CENTER or doctor/physician if you feel unwell.
If experiencing respiratory symptoms : Call a POISON CENTER or doctor/physician.
IF ON SKIN : Wash with plenty of soap and water.
If skin irritation or rash occurs : Get medical advice/attention
Wash contaminated clothing before reuse.
IF exposed or concerned : Get medical advice/attention.
Get medical advice/attention if you feel unwell. Collect spillage.

Storage :

Store locked up. Store in a well-ventilated place. Keep container tightly closed.

Disposal :

Dispose of contents/container in accordance to local, and regional regulations.

Composition

Substance Mixture

Information on Ingredients:

Synonyms: Nickel sulfate; Nickel salt; Nickel (II) Sulphate hexahydrate

Molecular formula: NiSO₄. 6H₂O

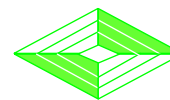
Molar mass: 262.86

CAS No. : 10101-97-0

First Aid Measures

Ingestion Large quantities of water should be drunk. Seek medical attention.

Inhalation Seek medical attention.



Skin	Wash thoroughly with water. For rashes seek medical advice. Show data sheet if possible
Eyes	Irrigate eyeball thoroughly with water for at least 10 minutes. If discomfort persists seek medical attention
Wounds	Cleanse thoroughly to remove any nickel sulphate particles.

Fire Fighting Measures

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

Accidental Release Measures

Person related precautionary measures :

Wear waterproof gloves and suitable protective clothing. Avoid generation of dusty atmospheres. Do not inhale dusts. Wear appropriate nationally approved respirators if collection and disposal of spills is likely to cause the concentration limits of airborne nickel to exceed the locally prescribed exposure limits.

Environmental Protection measures :

Do not allow spills to enter watercourses. Dispose of spills in accordance with local regulations.

Procedures for cleaning/absorption :

Collect spills by sweeping or vacuuming with the vacuum exhaust passing through a high efficiency particulate arresting (HEPA) filter if exhaust is discharged into the work place. Nickel-containing material is normally collected to recover nickel values.

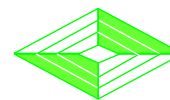
Handling and Storage

Handling :

Prevent the generation of inhalable dusts e.g. by the use of suitable ventilation. Do not inhale dust. Wear appropriate protective clothing, including waterproof gloves and nationally approved respirators. As packaged, nickel sulphate may constitute a manual handling risk.

Storage :

Keep in the container supplied, and keep container closed when not in use. Local regulations should be followed regarding the storage of this product.



Exposure Controls / Personal Protection

Nickel Sulphate Hexahydrate – CAS 10101-97-0		
	Exposure Limit (mg/m3)	Year
ACGIH TLV-TWA ⁽¹⁾	0.1 * ‡ as Ni	2008
UK WEL ⁽²⁾	0.1 as Ni	2006
Japan	1 as Ni	1968
Korea	0.1 as Ni	2006
China	0.5 as Ni	2007

* - as Ni in inhalable fraction

‡- as Ni in soluble fraction

Maintain airborne nickel levels as low as possible.

Occupational exposure controls :

a. Respiratory protection :

Do not inhale dust. Ventilation is normally required when handling or using this product to keep airborne nickel sulphate below the nationally authorized limits. If ventilation alone cannot control exposure, use respirators nationally approved for the purpose.

b. Eye protection:

Avoid eye contact. Wear goggles or face shield.

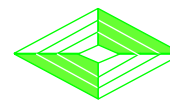
c. Hand & Skin Protection:

Avoid skin contact. Wear suitable protective clothing and waterproof gloves. Wash skin thoroughly after handling and before eating, drinking or smoking. Launder clothing and gloves as needed.

Physical and Chemical Properties

Green /white crystal. Slight acidic odor if wet.

Ingredient	Mol. Wt.
NiSO4-6H2O	262.8



pH (40g/100ml water solution)	≥ 3.0
Boiling point/ boiling range	N/A
Freezing point / freezing range	N/A
Flash Point	N/A
Evaporation rate	N/A
Flammability	N/A
Explosive properties	N/A
Vapour pressure	N/A
Vapour density	N/A
Bulk density	1.3 g/cm ³
Solubility cold water	400 g/l
Solubility hot water	800 g/l
Partition coefficient	N/A
Auto-ignition temperature	N/A
Decomposition temperature	Decomposes on heating Anhydrous salt sublimates at 764°C
Oxidizing properties	Not oxidizing
Viscosity	N/A
Particle size	N/A

Stability and Reactivity

Conditions to be avoided : Stable at ambient temperatures.

Substances to be avoided : None.

Hazardous decomposition products : At high temperatures toxic sulphur containing gases may be evolved.

Toxicological Information

Actual toxicity :

LD50 oral, rat : 275 mg/kg (as Nickel sulfate hexahydrate)

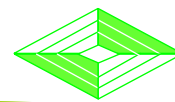
Inhalation :

The International Agency for Research on Cancer (IARC) concluded there was sufficient evidence that nickel compounds are carcinogenic to humans.

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 sulphate and nickel chloride and to insoluble forms of nickel. Electrolysis plant workers in an Ontario refinery similarly exposed to nickel sulphate and nickel chloride aerosols, but not the dust from matte roasting operations, did not show any increased incidence of respiratory cancer.

Exposure to aerosols of nickel sulphate can cause asthma and irritation of Repeated intraperitoneal injections (50 x 1 mg Ni) of nickel sulphate in rats produced abdominal tumors.

Although certain recent studies have helped to clarify the potential carcinogenicity of



soluble nickel compounds, such as nickel sulphate, there still remain some ambiguities in our precise understanding. There have been inconsistencies within the human epidemiological data regarding the role of soluble nickel in carcinogenesis. Recently completed animal studies using a relevant route of exposure, performed by the National Toxicology Program in the USA, have indicated that soluble nickel species are not carcinogenic themselves. There is no evidence from animal studies that nickel compounds are carcinogenic by relevant routes of exposure.

Skin Contact :

Exposure to aerosols and solutions of nickel sulphate can cause skin irritation, nickel sensitivity and allergic skin rashes.

Eye Contact :

May cause irritation.

Wounds :

Neither single nor repeated intramuscular injections of nickel sulphate have resulted in the development of tumors in rodents.

Ingestion :

The U.S. National Institute for Occupational Safety and Health (NIOSH) concluded there is no evidence that nickel and its inorganic compounds are carcinogenic when ingested.

Preexisting Conditions :

Contact can cause an allergic skin 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.

Ecological Information

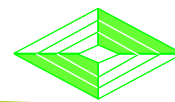
After ecotoxicity testing, Nickel sulphate is classified as very toxic. It requires labeling with the Environment pictogram. Labels must carry the risk phrase Toxic to aquatic life.

Disposal Information

Nickel containing material is normally collected to recover nickel values. Should disposal be deemed necessary follow local regulations. Take special note of the ecological classification.

Transport Information

Classified as dangerous goods for all modes of transport.



International Maritime Dangerous Goods Code	UN 3077, ENVIRONMENTALLY HAZARODOUS SUBSTANCE, SOLID, N.O.S. (nickel sulphate), Class 9, P.G.III, MARINE POLLUTANT
International Civil Aviation Organization Technical Instructions for the Carriage of Dangerous Goods by Air	UN 3077, ENVIRONMENTALLY HAZARODOUS SUBSTANCE, SOLID, N.O.S. (nickel sulphate), Class 9, P.G.III.
U.S. Dept. of Transportation Regulations	UN 3077, ENVIRONMENTALLY HAZARODOUS SUBSTANCE, SOLID, N.O.S. (nickel sulphate), Class 9, P.G.III,
Canadian Transportation of Dangerous Goods Act	UN 3077, ENVIRONMENTALLY HAZARODOUS SUBSTANCE, SOLID, N.O.S. (nickel sulphate), Class 9, P.G.III, MARINE POLLUTANT
European Agreement Concerning the International Carriage of Dangerous Goods by Road	Drivers are required to carry Travel Emergency (TREM) Card. UN 3077, ENVIRONMENTALLY HAZARODOUS SUBSTANCE, SOLID, N.O.S. (nickel sulphate), Class 9, P.G. III,

Regulatory Information

In Europe, Nickel sulphate is subject to the Control of Major Accident Hazards Directives 82/501/EEC, 96/82/EC & 98/433/EC (The Seveso Directive). Follow local regulations regarding the storage of this material.

Other Information

Note:

Zenith Chemical Corporation believes that the information in this Material Safety Data Sheet is accurate. However, Zenith Chemical Corporation makes no express or implied warranty as to the accuracy of such information and expressly disclaims any liability resulting from reliance on such information.

- 1). Threshold Limit Values of the American Conference of Governmental Industrial Hygienists. 2008.
- 2). Maximum Exposure Limit of the Health and Safety Executive in the U.K. in EH40/00.
- 3). Describes possible health hazards of the product supplied. If user operations change it to other chemical forms, whether as end products, intermediates or fugitive emissions, the possible health hazards of such forms must be determined by the user.

Safety Data Sheet prepared by :

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Product Stewardship : 886-4-26811521

The information contained herein is based on the present state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.