

1. Material Identification

Product Name : Nickel sulfate
Catalog Number : io-2719
CAS Number : 7786-81-4
Identified uses : Laboratory chemicals, manufacture of chemical compounds
Company : IonZ

>> R&D Use only

2. Hazards Identification

GHS Classification:

Flammable liquid (category 2)
Acute toxicity, oral (Category 3)
Acute toxicity, dermal (Category 3)
Acute toxicity, inhalation (Category 3)
Specific target organ toxicity, single exposure (Category 1)

Pictogram(s)



GHS Hazard Statements

- >> H302 (96.6%): Harmful if swallowed [Warning Acute toxicity, oral]
- >> H315 (99.9%): Causes skin irritation [Warning Skin corrosion/irritation]
- >> H317 (100%): May cause an allergic skin reaction [Warning Sensitization, Skin]
- >> H332 (99.9%): Harmful if inhaled [Warning Acute toxicity, inhalation]
- >> H334 (100%): May cause allergy or asthma symptoms or breathing difficulties if inhaled [Danger Sensitization, respiratory]
- >> H341 (99.8%): Suspected of causing genetic defects [Warning Germ cell mutagenicity]
- >> H350 (87.8%): May cause cancer [Danger Carcinogenicity]
- >> H350i (12.1%): May cause cancer by inhalation [Danger Carcinogenicity]
- >> H360 (85.8%): May damage fertility or the unborn child [Danger Reproductive toxicity]
- >> H360D (14.8%): May damage the unborn child [Danger Reproductive toxicity]
- >> H372 (99.9%): Causes damage to organs through prolonged or repeated exposure [Danger Specific target organ toxicity, repeated exposure]
- >> H400 (> 99.9%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]
- >> H410 (> 99.9%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

- >> P203, P233, P260, P261, P264, P270, P271, P272, P273, P280, P284, P301+P317, P302+P352, P304+P340, P317, P318, P319, P321, P330, P332+P317, P333+P317, P342+P316, P362+P364, P391, P403, P405, and P501

Health Hazards:

- >> Dermatitis. (USCG, 1999)
- >> Excerpt from ERG Guide 171 [Substances (Low to Moderate Hazard)]:
- >> Some may burn but none ignite readily. Containers may explode when heated. Some may be transported hot. For UN3508, Capacitor, asymmetric, be aware of possible short circuiting as this product is transported in a charged state. Polymeric beads, expandable (UN2211) may evolve flammable vapours. (ERG, 2024)
- >> Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.

3. Composition/Information On Ingredients

Chemical name : Nickel sulfate
CAS Number : 7786-81-4
Molecular Formula : NiO4S
Molecular Weight : 154.7600 g/mol

4. First Aid Measures

First Aid:

- >> EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.
- >> SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.
- >> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.
- >> INGESTION: Some heavy metals are VERY TOXIC POISONS, especially if their salts are very soluble in water (e.g., lead, chromium, mercury, bismuth, osmium, and arsenic). IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends inducing vomiting. Usually, this is NOT RECOMMENDED outside of a physician's care. If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, assure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.
- >> OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

First Aid Measures

Inhalation First Aid

- >> Fresh air, rest. Refer for medical attention.

Skin First Aid

- >> Wear protective gloves when administering first aid. Remove contaminated clothes. Rinse skin with plenty of water or shower.

Eye First Aid

- >> First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Ingestion First Aid

- >> Rinse mouth. Give one or two glasses of water to drink. Refer for medical attention .

5. Fire Fighting Measures

- >> Excerpt from ERG Guide 171 [Substances (Low to Moderate Hazard)]:
- >> CAUTION: Fire involving Safety devices (UN3268) and Fire suppressant dispersing devices (UN3559) may have a delayed activation and a risk of hazardous projectiles. Extinguish the fire at a safe distance.
- >> SMALL FIRE: Dry chemical, CO₂, water spray or regular foam.
- >> LARGE FIRE: Water spray, fog or regular foam. Do not scatter spilled material with high-pressure water streams. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal.
- >> FIRE INVOLVING TANKS: Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. (ERG, 2024)
- >> In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep drums, etc., cool by spraying with water.

6. Accidental Release Measures

Isolation and Evacuation:

Isolation and evacuation measures to take when a large amount of this chemical is accidentally released in an emergency.

- >> Excerpt from ERG Guide 171 [Substances (Low to Moderate Hazard)]:
- >> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- >> SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.
- >> FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

Spillage Disposal:

Methods for containment and safety measures to protect workers dealing with a spillage of this chemical.

- >> Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

7. Handling And Storage

Safe Storage:

- >> Store only in original packaging. Separated from oxidants and food and feedstuffs. Well closed. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

Storage Conditions:

- >> PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/

8. Exposure Control/ Personal Protection

- >> 1.0 [mg/m³], as Ni
- >> 0.1 [mg/m³], inhalable fraction, as Ni
- >> (as Ni, inhalable fraction): 0.1 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

- >> (inhalable fraction): sensitization of respiratory tract and skin (SAH); carcinogen category: 1

Inhalation Risk:

- >> Evaporation at 20 °C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

Effects of Short Term Exposure:

- >> The substance is irritating to the skin, eyes and respiratory tract.

Effects of Long Term Exposure:

- >> Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation may cause asthma. Repeated or prolonged inhalation of the aerosol may cause effects on the lungs. The substance may have effects on the nasal sinuses. This may result in inflammation and ulceration. This substance is carcinogenic to humans if inhaled. May cause toxicity to human reproduction or development.

Fire Prevention

- >> See Chemical Dangers.

Exposure Prevention

- >> PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!

Inhalation Prevention

- >> Use closed system or ventilation (not if powder).

Skin Prevention

- >> Protective gloves. Protective clothing.

Eye Prevention

- >> Wear safety spectacles, face shield or eye protection in combination with breathing protection if powder.

Ingestion Prevention

- >> Do not eat, drink, or smoke during work.

9. Physical And Chemical Properties

Molecular Weight:

- >> 154.76

Exact Mass:

- >> 153.887071

Physical Description:

- >> Anhydrous nickel sulfate is a yellow-green crystalline solid. Nickel sulfate can also be obtained as a hexahydrate (NiSO₄·6H₂O (CAS: 10101-97-0) which is blue to emerald green, and as a heptahydrate (NiSO₄·7H₂O) (CAS: 10101-98-1) , which is green. Samples can contain variable quantities of water, depending on their previous exposure to moisture or conditions. All forms are mildly toxic and are carcinogenic. All are denser than water. The primary hazard is the threat to the environment. Immediate steps should be taken to limit its spread to the environment. Used to make other nickel compounds, in printing, and in dyeing of textiles.
- >> YELLOW-TO-GREEN CRYSTALS.

Color/Form:

>> Green-yellow crystals

Odor:

>> Odorless

Boiling Point:

>> Decomposes (NTP, 1992)

Melting Point:

>> 1558 °F (decomposes) (NTP, 1992)
>> No melting point; decomposes at 848 °C

Solubility:

>> 27.3 to 27.7 % weight % at 68 °F (NTP, 1992)
>> Solubility in water, g/100ml at 20 °C: 29.3 (freely soluble)

Density:

>> 3.68 at 68 °F (USCG, 1999) – Denser than water; will sink
>> 3.7 g/cm³

Stability/Shelf Life:

>> STABLE @ 40 °C /HEXAHYDRATE/

Autoignition Temperature:

>> Not flammable (USCG, 1999)

Decomposition:

>> When heated to decomp it emits very toxic fumes of /sulfur oxides/.
>> 848 °C. This produces toxic fumes of sulfur trioxide and nickel monoxide. See ICSC 0926. See ICSC 1202. Reacts with oxidants. This generates fire and explosion hazard. The solution in water is a weak acid.

10. Stability And Reactivity

>> Water soluble yielding acidic corrosive water solutions.

11. Toxicological Information

Toxicity Summary:

>> Nickel is known to substitute for other essential elements in certain enzymes, such as calcineurin. It is genotoxic, and some nickel compounds have been shown to promote cell proliferation. Nickel has a high affinity for chromatin proteins, particularly histones and protamines. The complexing of nickel ions with heterochromatin results in a number of alterations including condensation, DNA hypermethylation, gene silencing, and inhibition of histone acetylation, which have been shown to disturb gene expression. Nickel has also been shown to alter several transcription factors, including hypoxia-inducible transcription factor, activating transcription factor, and NF-κB transcription factor. There is also evidence that nickel ions inhibit DNA repair, either by directly inhibiting DNA repair enzymes or competing with zinc ions for binding to zinc-finger DNA binding proteins, resulting in structural changes in DNA that prevent repair enzymes from binding. Nickel ions can also complex with a number of cellular ligands including amino acids, peptides, and proteins resulting in the generation of oxygen radicals, which induce base damage, DNA strand breaks, and DNA protein crosslinks. (L41, A40)

Evidence for Carcinogenicity:

Evidence that this chemical does or may cause cancer. The information here is collected from various sources by the Hazardous Substances Data Bank (HSDB).

>> CLASSIFICATION: A; human carcinogen. BASIS FOR CLASSIFICATION: Human data in which exposure to nickel refinery dust caused lung and nasal tumors in sulfide nickel matte refinery workers in several epidemiologic studies in different

countries and on animal data in which carcinomas were produced in rats by inhalation and injection. HUMAN CARCINOGENICITY DATA: Sufficient. /Nickel refinery dust/

Carcinogen Classification:

This section provides the International Agency for Research on Cancer (IARC) Carcinogenic Classification and related monograph links. In the IARC Carcinogenic classification, chemicals are categorized into four groups: Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), Group 2B (possibly carcinogenic to humans), and Group 3 (not classifiable as to its carcinogenicity to humans).

>> 1, carcinogenic to humans. (L135)

Health Effects:

>> The most common harmful health effect of nickel in humans is an allergic reaction. This usually manifests as a skin rash, although some people experience asthma attacks. Long term inhalation of nickel causes chronic bronchitis and reduced lung function, as well as damage to the nasal cavity. Ingestion of excess nickel results in damage to the stomach, blood, liver, kidneys, and immune system, as well as having adverse effects on reproduction and development. (L41)

Exposure Routes:

>> The substance can be absorbed into the body by inhalation, by ingestion and through the skin.

>> Inhalation (L41) ; oral (L41) ; dermal (L41)

Inhalation Exposure

>> Cough. Sore throat.

Skin Exposure

>> Redness.

Eye Exposure

>> Redness.

Ingestion Exposure

>> Abdominal pain. Dizziness. Headache. Nausea. Vomiting.

>> Symptoms of nickel poisoning include headache, nausea, vomiting, dizziness, irritability, and difficulty sleeping, followed by chest pains, sweating, rapid heart beat, and a dry cough. (L42)

Cancer Sites:

The site in which cancer develops due to exposure to this compound. Cancers are casually referred to based on their primary sites (e.g., skin, lung, breasts, prostate, colon and rectum).

>> Respiratory

Adverse Effects:

An adverse effect is an undesired harmful effect resulting from a medical treatment or other intervention.

>> Skin Sensitizer – An agent that can induce an allergic reaction in the skin.

>> Asthma – Reversible bronchoconstriction (narrowing of bronchioles) initiated by the inhalation of irritating or allergenic agents.

>> IARC Carcinogen – Class 1: International Agency for Research on Cancer classifies chemicals as established human carcinogens.

>> NTP Carcinogen – Known to be a human carcinogen.

>> ACGIH Carcinogen – Not Classifiable.

Toxicity Data:

>> LD50: 264 mg/kg (Oral, Rat) (L511)

Minimum Risk Level:

The minimal risk level (MRL) is an estimate of the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health

>> Intermediate Inhalation: 0.0002 mg/m3 (L134) Chronic Inhalation: 0.00009 mg/m3 (L134)

Treatment:

Treatment when exposed to toxin

>> Excess exposure to nickel is usually handled by preventing further exposure and symptomatic treatment. Nickel poisoning may also be treated using chelation therapy with sodium diethyldithiocarbamate. (L42)

Interactions:

>> The hamster embryo cell bioassay was used to study the effect of metal salts on morphological transformation. A synergistic enhancement of the transformation frequency was found for the combined treatment with organic carcinogens (benzo(a)pyrene (b(a)p), N-hydroxy-2-acetylaminofluorene and 4-nitroquinoline-1-oxide) and nickel sulfate. The synergistic effect between b(a)p and nickel sulfate was apparent when the cells were treated sequentially with the chemicals. When the cells were first exposed to b(a)p, nickel sulfate showed a promotion-like effect, similar to that obtained with the tumor promoter 12-O-tetradecanoylphorbol-13-acetate (12-O-tpa). When 12-O-tpa or b(a)p were used as promoters nickel sulfate was able to initiate morphological transformation. The metal salts are more potent as promoters than they are as initiators in this assay.

Antidote and Emergency Treatment:

>> Basic treatment: Establish a patent airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilation if necessary. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for shock and treat if necessary Monitor for pulmonary edema and treat if necessary For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool /Nickel and related compounds/

Human Toxicity Excerpts:

>> IN 1972-74 THREE THOUSAND SUBJECTS IN NORTH AMERICA WERE PATCH-TESTED WITH 19 ALLERGENS. THE MOST FREQUENT SENSITIZERS INCL NICKEL SULFATE.

Non-Human Toxicity Excerpts:

>> ... EXAM A GROUP OF 40 MALE ALBINO RATS THAT HAD RECEIVED 3 MG NI/KG BODY WT AS NICKEL SULFATE HEXAHYDRATE NISO₄.6H₂O DAILY FOR 90 DAYS FOR CHANGES IN ENZYME ACTIVITIES & MORPHOLOGY. ... CHANGES IN ATPASE OCCURRED AT ALL EXAM TIMES IN KIDNEYS & TESTES, PROVING STIMULATORY AT ALL PERIODS IN TESTES, BUT ONLY AT 30 DAYS IN KIDNEYS, AFTER WHICH ACTIVITY SIGNIFICANTLY DECR ... A LATENT PERIOD OF ABOUT 90 DAYS ELAPSED BEFORE PHOSPHORYLASE ACTIVITY OF CARDIAC MUSCLE SHOWED SIGNIFICANT DEPRESSION ... ASSOC WITH THESE BIOCHEMICAL CHANGES WERE DELAYED HISTOLOGICAL CHANGES IN KIDNEY WHICH BECAME CONGESTED AT 60 DAYS ... BY 90 DAYS FOCAL & NECROSIS OF PROXIMAL CONVOLUTED TUBULES ... DEGENERATIVE CHANGES IN ... SEMINIFEROUS TUBULES ... & MYOCARDIAL NECROSIS ... /NICKEL SULFATE HEXAHYDRATE/

Non-Human Toxicity Values:

>> LC50 Japanese quail (*Coturnix japonica* Temminck & Schlegel) 14-day-old > 5000 ppm (5-day diet)

National Toxicology Program Studies:

Reports from the National Toxicology Program, an interagency program supported by three government agencies (NIH, FDA, and CDC) within the Department of Health and Human Services. This program plays a critical role in generating, interpreting, and sharing toxicological information about chemicals of public health concerns.

>> ... Male and female F344/N rats and B6C3F1 mice were exposed to nickel sulfate hexahydrate (greater than 98% pure) by inhalation for ... or 2 yr. ... 2 YEAR STUDY IN RATS: Groups of 63 to 65 male and 63 to 64 female rats were exposed to nickel sulfate hexahydrate by inhalation at concentrations of 0, 0.12, 0.25, or 0.5 mg/ cu m (equivalent to 0, 0.03, 0.06, or 0.11 mg nickel/cu m). Animals were exposed for 6 hours plus T90 (8 minutes) 5 days/wk for 104 wk. ... 2 YEAR STUDY IN MICE: Groups of 80 male and 80 female mice were exposed to nickel sulfate hexahydrate by inhalation at concentrations of 0, 0.25, 0.5, or 1 mg/cu m (equivalent to 0, 0.06, 0.11, or 0.22 mg nickel/cu m). Animals were exposed for 6 hours plus T90 (8 minutes) 5 days per week for 104 wk. ... CONCLUSIONS: Under the conditions of these 2 yr inhalation studies, there was no evidence of carcinogenic activity of nickel sulfate hexahydrate in male or female F344/N rats exposed to 0.12, 0.25, or 0.5 mg/cu m (0.03, 0.06, or 0.11 mg nickel/cu m). There was no evidence of carcinogenic activity of nickel sulfate hexahydrate in male or female B6C3F1 mice exposed to 0.25, 0.5, or 1 mg/cu m (0.06, 0.11, or 0.22 mg nickel/cu m).

TSCA Test Submissions:

Under the Toxic Substances Control Act (TSCA), EPA has broad authority to issue regulations designed to require manufacturers (including importers) or processors to test chemical substances and mixtures for health and environmental effects. This section provides information on test reports submitted for this chemical under TSCA.

>> Nickel sulfate (CAS # 7786-81-4) was evaluated for repeated-dose inhalation toxicity in Fischer 344/N rats (5/sex/group) administered daily whole-body exposures to target aerosol (MMAD 1.9 µm) concentrations of 0, 3.5, 7.0, 15, 30, and 60 mg/cu m in air, 6 hours/day for a total of 12 days in 2 weeks. The 2-week study established exposure limits to be used in 90-day and chronic exposure studies. Exposures were associated with rapid breathing (all levels), reduced mean terminal bodyweights (all levels), lethargy (7.0 mg/cu m and above), and increased mortality (15, 30, and 60 mg/cu m). Females exposed to levels of 7.0 mg/cu m and above also exhibited significant changes in liver, lung, and thymus/brain weight ratios. Gross pathology revealed treatment-related lesions of the lung, liver, thymus, spleen, testicle, nose, and bronchial lymph nodes. A necrotizing pneumonia constituted cause of unscheduled deaths (30, 60

mg/cu m) and was present in all exposed animals at terminal sacrifice. Pulmonary lesions were primarily characterized by edema and hemorrhage. Histological examination revealed epithelial degeneration of the alveola with vacuolization and necrosis of isolated cells and hypertrophy of goblet cells; dilated and mucinous terminal airways with accumulation of alveolar macrophages and necrotic debris; and minimal mixed inflammatory cell infiltrate in the pulmonary interstitium of increasing severity with increased level of exposure. Distinct treatment-related lesions of the nose, bronchial lymph nodes, testicles, and liver, respectively, were characterized by atrophy of the olfactory epithelium (all exposure levels), atrophy with depleted splenic and thymic lymphocytes, lymphoid depletion (30 and 60 mg/cu m) or paracortical lymphocyte hyperplasia (lower exposure levels) of the bronchial lymph nodes, thinning of the germinal epithelium of testicular tubules with focal accumulation of necrotic debris and giant cells in the lumina, and hepatic atrophy with hepatocyte depletion corresponding to reduced liver weights in rats exposed to atmospheres of 7.0 mg/cu m nickel sulfate and above.

12. Ecological Information

Resident Soil (mg/kg)

>> 8.20e+02

Industrial Soil (mg/kg)

>> 1.10e+04

Resident Air (ug/m3)

>> 1.20e-02

Industrial Air (ug/m3)

>> 5.10e-02

Tapwater (ug/L)

>> 2.20e+02

MCL (ug/L)

>> 4.0E+03(G)

Risk-based SSL (mg/kg)

>> 3.20e+01

Inhalation Unit Risk (ug/m3)-1

>> 2.40e-04

Chronic Oral Reference Dose (mg/kg-day)

>> 1.10e-02

Chronic Inhalation Reference Concentration (mg/m3)

>> 1.4e-05

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 0.04

ICSC Environmental Data:

>> The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised not to let the chemical enter into the environment.

13. Disposal Considerations

Spillage Disposal

- >> Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

Disposal Methods

- >> SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices.
- >> PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/
- >> PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/
- >> PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/
- >> For more Disposal Methods (Complete) data for NICKEL SULFATE (6 total), please visit the HSDB record page.

14. Transport Information

DOT

Nickel sulfate

9

UN Pack Group: III

Reportable Quantity of 100 lb or 45

IATA

Nickel sulfate

9,

UN Pack Group: III

15. Regulatory Information

Federal Drinking Water Guidelines:

Federal drinking water guidelines (e.g. maximum containment level (MCL)) for this chemical. In general, these guidelines are recommendations and not legally enforceable.

- >> EPA 100 ug/l /Nickel/

State Drinking Water Standards:

State drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

- >> (CA) CALIFORNIA 100 ug/L /Nickel/

Clean Water Act Requirements:

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under CWA, the U.S. Environmental Protection

Agency (EPA) developed the Toxic Pollutant List (40 CFR Part 401.15) and the Priority Pollutant List (40 CFR Part 423, Appendix A). These lists are to be used by EPA and States to develop the Effluent Guidelines regulations and ensure water quality criteria and standards.

- >> Toxic pollutant designated pursuant to section 307(a)(1) of the Clean Water Act and is subject to effluent limitations. /Nickel and compounds/

Regulatory Information

The Australian Inventory of Industrial Chemicals

- >> Chemical: Sulfuric acid, nickel(2+) salt (1:1)

REACH Registered Substance

- >> Status: Active Update: 25-04-2023 <https://echa.europa.eu/registration-dossier/-/registered-dossier/15304>
- >> Status: Cease Manufacture Update: 23-05-2018 <https://echa.europa.eu/registration-dossier/-/registered-dossier/25017>

REACH Restricted Substance

- >> Restricted substance: Nickel sulphate
- >> EC: 232-104-9

REACH Restricted Substance

- >> Restricted substance: Nickel(II) sulfate hexa-/ heptahydrate
- >> EC: 630-456-1

New Zealand EPA Inventory of Chemical Status

- >> Nickel (II) sulfate: HSNO Approval: HSR003932 Approved with controls

16. Other Information

Toxic Combustion Products:

Toxic products (e.g., gases and vapors) produced from the combustion of this chemical.

- >> Toxic gases and vapors (such as nickel carbonyl) may be released in a fire involving nickel ... /Nickel & sol nickel cmpd/

Other Safety Information

Chemical Assessment

- >> IMAP assessments – Water soluble nickel(2+) salts: Environment tier II assessment
- >> IMAP assessments – Nickel sulfate: Human health tier II assessment

"The information provided is believed to be accurate but is not comprehensive and should be used as a reference. It reflects our current knowledge and is intended for safety guidance related to the product. This document does not constitute a warranty of the product's properties. lonz is not responsible for any damages resulting from handling or contact with the product incorrectly."