
SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier:**Trade name:** nickel sulphate dihydrate**UN-No.:** 2923**1.2 Relevant identified uses of the substance or mixture and uses advised against**

Identified uses: Apart from the nickel oxide, technically the most significant chemical compound of nickel. A starting product for the production of catalysts and other nickel compounds. It is used in electroplating baths – for nickel electroplating, for production of nickel catalysts, for production of paints and varnishes, in ceramics.

Uses advised against: the product cannot be available to the general public.

1.3 Details of the supplier of the material safety data sheet:

KGHM Polska Miedź S.A.
"Legnica" Copper Smelter & Refinery
ul. Złotoryjska 194
59-220 Legnica

1.4. Emergency telephone number:

Head of Copper Electrorefining Department: (48 76) 747 53 01 lines open Mon-Fri 7:¹⁵ am - 3:¹⁵ pm

Head of Customer Service Section and End Product Warehouse: (48 76) 747 28 00 lines open Mon-Fri 7:¹⁵ am - 3:¹⁵ pm

Telefax: 076/747 20 05

Person responsible for the Safety Data Sheet: **(48 76) 747 52 06** / e-mail: karty.charakterystyki@kg hm.pl

Producer's emergency telephone number: **(48 76) 747 50 02** – 24/7

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture:

Classification according to Regulation No. 1272/2008 (CLP):

Carc. 1A; H350 - may cause cancer;

Muta. 2; H341 - suspected of causing genetic defects.

Repr. 1 B; H360D - may damage the unborn child.

STOT RE 1; H372 - causes damage to organs through prolonged or repeated exposure.

Acute Tox. 4; H302 - harmful if swallowed;

Acute Tox. 4; H332 - harmful if inhaled;

Skin Corr. 1; H314 - causes severe skin burns and eye damage;

Resp. Sens. 1; H334 - may cause allergy or asthma symptoms or breathing difficulties if inhaled;

Skin Sens. 1; H317 - may cause an allergic skin reaction;

Met. Corr 1; H290 - may be corrosive to metals;

Aquatic Acute 1; H400 - very toxic to aquatic life;

Aquatic Chronic 1; H410 - very toxic to aquatic life with long lasting effects

Classification according to Directive 67/548/EWG:

Carc. cat. 1; R45 - may cause cancer;

Repro. cat. 2; R61 - may cause harm to the unborn child

Xn; R20/22 - harmful by inhalation and if swallowed;

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C; R 34 - causes burns;

R42/43 - may cause sensitization by inhalation and skin contact;

T; R48/23 - toxic: danger of serious damage to health by prolonged exposure through inhalation

Muta. cat. 3; R68 - possible risk of irreversible effects;

N; R50/53 - very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

2.2. Label elements:

"Restricted to professional users".



Signal Word: "DANGER"

Hazard statements (H):

H350 - May cause cancer.

H341 - Suspected of causing genetic defects.

H360D - May damage the unborn child.

H372 - Causes damage to organs through prolonged or repeated exposure.

H302 - Harmful if swallowed.

H332 - Harmful if inhaled.

H314 - Causes severe skin burns and eye damage.

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.

H317 - May cause an allergic skin reaction.

H290 - May be corrosive to metals.

H400 - Very toxic to aquatic life.

H410 - Very toxic to aquatic life with long lasting effects.

Precautionary Statements (P):

P202 - Do not handle until all safety precautions have been read and understood.

P314 - Get medical advice/attention if you feel unwell.

P405 - Store locked up.

P501 - Dispose of contents/container to producer of product.

P273 - Avoid release to the environment.

P406 - Store in corrosive resistant/... container with a resistant inner liner

The other compulsory label elements are stated in Title III of the Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No. 1907/2006 as amended.

2.3 Other hazards:

After heating up to higher temperatures, toxic products of decomposition are released, such as As_2O_3 , SO_2 , SO_3 . At temperature higher than $840^\circ C$, nickel (II) oxide is released. The substance reacts with most of metals and releases flammable hydrogen. Product does not meet classification criteria of PBT and vPvB.

SECTION 3. Composition/information on ingredients

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3.1. Substances: n/a

3.2. Mixtures:

a) according to the Regulation No. 1272/2008 (CLP):

No.	Name of substance	CAS No.	EC No.	Index No.	Content [mass fraction in %]	Symbols	H statements	REACH registr. No.
1.	Nickel(II) sulphate(VI) NiSO ₄ x n H ₂ O (n = 1, 3, 4)	7786-81-4	232-104-9	028-009-00-5	88 ≤ c ≤ 96	Carc. 1A; Muta. 2; Repr. 1B; STOT RE 1 Acute tox. 4 Acute tox. 4 Skin. Irrit. 2 Resp. Sens. 1 Skin. Sens. 1 Aquatic Acute 1 Aquatic Chronic 1	H350i H341 H360D H372 H302 H332 H315 H334 H317 H400 H410	01-2119439361 44-0003
2.	Sulphuric acid(VI) H ₂ SO ₄	7664-93-9	231-639-5	016-020-00-8	c ≤ 10	Skin. Corr. 1A	H314	01-2119458838 20-0041
3.	Arsenic(III) oxide As ₂ O ₃	1327-53-3	231-901-9	033-003-00-0	≤ 0.5	Carc. 1A Acute Tox. 2 Skin. Corr 1B Aquatic Acute 1 Aquatic Chronic 1	H350 H300 H314 H400 H410	Impurity included in nickel(II) sulphate(VI) registration dossier

b) according to Directive No. 67/548/EWG:

No.	Name of substance	CAS No.	EC No.	Index No.	Content [mass fraction in %]	Symbols	R phrases	REACH registration number
1.	Nickel(II) sulphate(VI) NiSO ₄ x n H ₂ O (n = 1, 3, 4)	7786-81-4	232-104-9	028-009-00-5	88 ≤ c ≤ 96	Carc., cat. 1 Repro. cat. 2; Muta. cat.3; T; Xn, Xi; N	49-61-20/22-38-42/43-	01-2119439361 44-0003
2.	Sulphuric acid(VI) H ₂ SO ₄	7664-93-9	231-639-5	016-020-00-8	c ≤ 10	C	35	01-2119458838 20-0041
3.	Arsenic(III) oxide As ₂ O ₃	1327-53-3	231-901-9	033-003-00-0	≤ 0.5	Carc. cat.1 T+; C; N	45-28-34-50/53	Impurity included in nickel(II) sulphate(VI) registration dossier

Full text of H and R phrases not expanded in Section 2 can be found Section 16.

SECTION 4. First Aid measures

4.1 Description of first aid measures:

Inhalation: provide calmness, fresh air and medical aid. With the hazard of the loss of consciousness, apply recumbent position, transport in stable lateral position. Medical assistance necessary. Apply artificial respiration if needed.

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Skin contact: remove contaminated clothing. Areas of skin that have come into contact with the product must be washed thoroughly with water and soap. If skin irritation persists, seek dermatological assistance.

Eye contact: with the eyelids widely open, rinse the eyes with plenty of running water (protect the eye that has not come into contact with the product, remove contact lenses), ophthalmological check-up examination.

Ingestion: rinse the mouth immediately. Call medical assistance immediately.

4.2. Most important symptoms and effects, both acute and delayed:

Ways of exposure: alimentary way, respiratory ways, skin, eyes.

- respiratory ways: vapour/dust is toxic, pose serious threat to health after long-term exposure, may cause cancer, cause burning of mucosa, dyspnoea, may cause sensitization;
- alimentary system: ingestion causes acute pain, nausea, vomiting, diarrhoea, burning of stomach cavity, throat, gullet;
- skin contact: causes burns, ulceration, may cause sensitization;
- contact with eyes: vapour/dust causes burning of eyelids and eyeballs.

Acute intoxication symptoms: Product in the form of mist and fumes causes pain, weeping, burns of conjunctiva, cornea, throat pains, cough, shallow breathing, accelerated breathing, breathlessness, glottis spasm, larynx oedema, bronchi spasm, lungs oedema. Death may occur as a result of glottis spasm. Skin contamination causes thermal (exothermic reaction with moist skin) and chemical burning. Eyes contamination causes burning of eyelids, eyeball and permanent damage. When ingested, causes burns of oral cavity, throat, gullet; may lead to perforation of gullet, stomach, bleeding of alimentary tract, shock. Acute intoxication results in anaemia with leucopenia, polyneuronal lesions, hepatocellular damages, psychotic conditions, desquamative skin inflammation.

Long-term exposure: Repeated skin contact with the product causes sensitization lesions in its area; repeated respiratory tracts contact may cause bronchial asthma and the hazard of the mouth, fauces and lung neoplasm. Long-lasting contact may cause long-lasting conjunctivitis, epistaxis, long-lasting bronchitis. Repeated skin exposure may cause ulceration, nail lesions, tooth enamel damage.

4.3 Indication of any immediate medical attention and special treatment needed:

In the case of swallowing, the patient should drink a lot of water with the addition of a considerable amount of activated charcoal and magnesium oxide, induce vomiting, and then take laxative.

SECTION 5. Firefighting measures

5.1 Extinguishing media:

Suitable extinguishing media: Non-flammable solid substance, apply extinguishing media depending on the materials stored nearby: water (if the container is tight) - sprayed jet, carbon dioxide, extinguishing powders, foam extinguishers, sand.

Unsuitable extinguishing media: Not known.

5.2 Special hazards arising from the substance or mixture:

In the fire sulphur dioxide and / or sulphur trioxide may be released.

First actions in the case of fire: The product itself is non-flammable. Cool the product and containers engulfed by fire with sprayed water, cover with foam and, when possible, remove from the hazard area. Apply suitable extinguishing media on the area around the fire.

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5.3 Advice for fire-fighters:

Fire fighters should be equipped with gas-tight protective clothing and self-contained breathing apparatus. The actions of product removal should be taken with respiratory tract protective equipment, face mask and protective clothing. Do not let the fire water, contaminated with the substance, to penetrate surface or underground water.

SECTION 6: Accidental release measures

General recommendation: In the case of nickel sulphate release to the environment, the contaminated area must be isolated.

First, the source of environment contamination must be cut off. If needed, call rescue service. Protect water sources and sewage systems. While cleaning, avoid dust rising.

6.1 Personal precautions, protective equipment and emergency procedures:

Persons who do not take part in the rescue action must be removed from the hazard area. Apply personal protection equipment described in section 8.

6.2 Environmental precautions:

In the case of accident, stop from disposal to the environment. Prevent from being discharged into drains. Try to collect, as far as possible, into suitable containers for further utilisation.

6.3 Methods and material for containment and cleaning up:

Protect the surface from product spill. Eliminate leakages (tighten the damaged packaging and place in protective packaging). Collect the spilled substance into a container and remove as hazardous waste. In the case of solutions, collect the spilled product with absorbing means (diatomaceous earth, sand or other absorbent which does not react with the product) into a container with a lid. The contaminated ground is subject to exchange.

6.4 Reference to other sections

Personal protection equipment described in section 8.2.2 Disposal considerations in section 13.

SECTION 7. Handling and storage

7.1 Precautions for safe handling:

Avoid creating aerosols at the workplace. Use only small amounts of the product in a properly labelled room with ventilation in good working order. The protective means for product spills should be available at the workplace. The containers with the product should be labelled. The containers, when not in use, must be closed. Empty containers may contain residues which are dangerous. When handling the product, do not eat, do not drink and do not smoke. Wash your hands, when using the product, before eating a meal. Do not swallow. The rooms must have proper exhaust ventilation. The workplace should be equipped with safety shower (for washing the whole body) and a separate shower (spray shower) for rinsing the eyes.

7.2 Conditions for safe storage, including any incompatibilities:

Store in properly identified and tight acid resistant containers. Protect the container against damage. Properly identify the storage place with access for authorized, trained personnel only.

Ventilation requirements: The rooms must be equipped with appropriate local exhaust ventilation with housing in the area of vapours/dust emission to the air as well as general ventilation of the room. In case of insufficient ventilation, wear suitable individual protection of the respiratory system.

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Other information: Always keep in original containers. Do not use emptied container for other purposes.

7.3 Specific end use(s):

Identified uses are listed in section 1.2.

SECTION 8. Exposure control/personal protection

8.1 Control parameters:

The following current national occupational exposure limit values apply (Poland):

No.	Substance name	CAS No.	TLV-TWA [mg/m ³]	TLV-STEL [mg/m ³]
1.	Nickel and its compounds, except nickel tetracarbonyl – calculated to Ni	-	0.25	-
2.	Sulphuric acid (VI) – mists – thoracic fraction ⁽¹⁾	7664-93-9	1 0.05	3
3.	Arsenic and its inorganic compounds calculated to As	-	0.01	-

The following current national occupational exposure limit values apply (recipients):

No.	Substance name	CAS No.	TLV-TWA [mg/m ³]	TLV-STEL [mg/m ³]
1.	Soluble nickel compounds, except nickel tetracarbonyl – calculated to Ni Nickel compounds calculated to Ni Soluble nickel salts calculated to Ni	-	0.1 (ACGIH-TWA, USA) 1 (OSHA PEL, USA) 0.1 (MEL, Great Britain) 0.1 (TWA, Belgium) 0.1 (HTP, Finland) 0.05 (MAK-Wert, Germany)	-
2.	Sulphuric acid Sulphuric acid (vapours) ⁽¹⁾⁽²⁾	7664-93-9	0.2 (ACGIH-TWA, USA) 1 (OSHA-PEL, USA) 0.2 (HTP, Finland) 0.1(MAK-Wert, Germany) 0.05 (European Union)	3 (ACGIH-TWA, USA) - 1 (HTP, Finland) 0.1 (MAK-Wert Germany)
3.	Arsenic and its inorganic compounds calculated to As Arsenic and its compounds, except for arsenic hydride calculated to As Arsenic (III) oxide	-	0.01 (ACGIH-TWA, USA) 0.01 (HTP, Finland) 0.1 (TWA, Great Britain) 0.1 (MAK-Wert, Germany)	-

⁽¹⁾ When selecting appropriate method of monitoring the exposure, consider potential limitations and disturbances which could be created in the presence of other sulphur compounds.

⁽²⁾ Vapours are defined as trachea fraction

Legal basis:

Regulation of the Minister of Labour and Social Policy of November 29th, 2002 on the highest allowable concentrations and intensities of agents harmful for health in the work environment (Official Journal 02.217.1833 with subsequent amendments); According to Directive of the Commission 91/322/EWG of May 29th, 1991, on establishing indicative limit values by implementing Council Directive 80/1107/EEC on the protection of workers from the risks related to exposure to

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chemical, physical and biological agents at work. (Official Journal L 177 of 5.7.1991); According to Directive 2000/39/EC - indicative occupational exposure limit values of 8 June 2000 establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work. (Official Journal L 142 of 16.6.2000 with subsequent amendments); Directive of the Commission 2009/161/EU of December 17th, 2009, establishing the third list of indicative values of occupational exposure in order to execute the Directive 98/24/EC as well as amending the Commission Directive 2000/39/EC (Official Journal L 338 of 19.12.2009);

The derived no-effect levels (DNELs) for nickel - workers:

Acute exposure, inhalation, DNEL = 16 mg Ni/m³

Chronic exposure, inhalation, DNEL = 0.05 mg Ni/m³

Chronic exposure, dermal, DNEL = 0.00044 mg Ni/cm²

The derived no-effect levels (DNELs) for nickel - the general public:

Acute exposure, inhalation, DNEL = 9.6 mg Ni/m³

Acute exposure, oral, DNEL = 0.012 mg Ni / kg / day

Chronic exposure, inhalation, DNEL = 0.00002 mg Ni/m³

8.2 Exposure controls:**8.2.1 Appropriate engineering controls at industrial settings**

Information contained in exposure scenarios attached to the Safety Data Sheet.

8.2.2 Individual protection measures, such as personal protective equipment

Eye/face protection: Use protective goggles with face protection,

Hands protection: Use protective gloves,

Skin protection: Use acid resistant clothing,

Respiratory ways protection: Necessary when vapours/dusts are formed - gas mask (absorber of acidic vapours), dust mask equipped with filter suitable for determined air concentration, if the substance concentration is not known, apply respiratory ways isolation equipment.

Thermal hazards: Not applicable Hygiene means:

Immediately change contaminated clothing. Decontaminate clothing in water before reuse. Wash your hands and face after working with the substance. Do not eat and drink during substance handling.

8.2.3. Environmental exposure controls:

Environmental exposure should be controlled in compliance with national environment protection legislation in force.

SECTION 9. Physical and chemical properties

9.1 Information on basic physical and chemical properties:

Appearance: solid, yellow colour;

Odour: odourless;

Level of odour perception: n.a.

pH of saturated solution: about 1 (100 g/l H₂O, 20 °C)

Melting/: at temp. 103 °C - 110 °C loses crystallization water, anhydrous melt at temp. 280 °C;

Freezing point: not determined;

Initial boiling point and boiling temperature range: n.a.

Ignition temperature: n.a. inflammable product

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Evaporation rate: n.a.

Flammability: n.a. inflammable product

Low/high flammability point or high/low explosion point: n.a.

Vapour pressure: n.a.

Vapour density: n.a

Relative density: waterless form 3.68 g/cm³, hexahydrate form 2.07 g/cm³Bulk density: 1800 kg/m³;

Solubility:

- in water: about 293 g/l at temp. 20 °C, 873g/l at temp. 100 °C;
- in organic solvents: a little soluble in alcohols, poorly soluble in ethanol, a bit better in methanol;

Distribution coefficient: n-octanol/ water: n.a.

Autoignition temperature: not applicable.

Breakdown temperature: not applicable.

Viscosity: not applicable.

Explosive properties: not applicable.

Oxidizing properties: not applicable

9.2 Other information:None

SECTION 10. Stability and reactivity

10.1. Reactivity: When in contact with common metals, hydrogen releases. After heating up, the substance explosively reacts with aluminium and magnesium powder.**10.2. Chemical stability:** The substance is stable under normal conditions.**10.3 Possibility of hazardous reactions:** Not known.**10.4 Conditions to avoid:** High temperature.**10.5 Incompatible materials:** strong acids, aluminium, magnesium. Nickel sulphate reacts explosively with aluminium or magnesium powder upon heating. Poor corrosive properties.**10.6 Hazardous decomposition products:**In case of heating up to higher temperatures the following toxic products of decomposition are released: sulphur oxides (SO₂, SO₃), nickel oxides, arsenic oxides.Consecutive data: releases crystallization water upon heating.

SECTION 11. Toxicological information

11.1 Information on toxicological effects:**a) Acute toxicity:**Acute toxicity (oral):

Due to the nickel (II) sulfate (VI) and arsenic (III) oxide content product meets classification criteria as harmful after swallowing (Acute Tox. 4; H302).

After swallowing causes sharp pain, nausea, vomits, diarrhoea, oral cavity, throat and gullet burns. Acute toxicity (inhalation):

Due to the nickel (II) sulfate (VI) and sulphuric (VI) acid content product meets classification criteria as harmful after inhaling (Acute Tox. 4; H332).

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Vapours/dust have toxic action, create serious health risk in long-term exposure, may cause cancer, mucosae burns, dyspnoea, may cause sensitisation.

Acute toxicity(skin contact):

on the basis of available data the classification criteria are not met.

Toxic and lethal doses and concentrations:**NiSO₄:**

LD₅₀ (rat/females, oral): 361.9 mg/kg,

LC₅₀ 4h (rat, inhalation): 2.48 mg/l,

LD₅₀ (rat, skin): no data

H₂SO₄:

LD₅₀ (rat, oral): 2140 mg/kg,

LC₅₀ (rat, inhalation): 375 mg/m³,

LC₅₀ 4h (mouse, inhalation): 0.85 mg/l,

LC₅₀ 8h (mouse, inhalation): 0.6 mg/l,

LD₅₀ (rat, skin):

no data

H₃AsO₄:

LD₅₀ (mouse/females, oral): 160.4 mg/kg,

LD₅₀ (mouse/females, oral): 141.4 mg/kg,

LC₅₀ 4h (mouse/females, inhalation): 1.153 mg/l,

LC₅₀ 4h (mouse/females, inhalation): 0.794 mg/l,

LD₅₀ (rabbit/females, skin): 2300 mg/kg

LD₅₀ (rabbit/females, skin): 1750 mg/kg

b) Skin corrosion/irritation:

due to pH of the product (approx. 1) the product was classified as:

Skin Corr.;H314 The substance causes severe skin burns and eye damage

c) Serious eye damage/ eye irritating:

due to pH of the product (approx. 1) the product was classified as:

Skin Corr.;H314 The substance causes severe skin burns and eye damage

d) Respiratory tract or skin sensitization:

due to NiSO₄ content above concentration limit the product was classified as:

Skin Sens. 1; H317 - may cause an allergic skin reaction.

Resp. Sens. 1; H334 - may cause allergy or asthma symptoms or breathing difficulties after inhalation.

e) Germ cell mutagenicity:

due to NiSO₄ content above concentration limit the product was classified as:

Muta. 2; H341 - suspected of causing genetic defects

f) Carcinogenicity:

due to H₃AsO₄ content above concentration limit the product was classified as:

Carc. 1A; H350 - may cause cancer

g) Reproductive toxicity:

due to NiSO₄ content above concentration limit the product was classified as:

Repr. 1B; H360D - May damage the unborn child.

h) Specific target organ toxicity — Single exposure:

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on the basis of available data the classification criteria are not met

i) Specific target organ toxicity — Repeated exposure:

due to NiSO₄ content above concentration limit the product is classified as:

STOT RE 1; H372 - Causes damage to organs through prolonged or repeated exposure.

According to chemical safety assessment carried out for nickel(II) sulfate(VI) the respiratoryway exposure causes danger in long-term or repeated exposure and damaged organs are lungs.

j) Aspiration hazard

on the basis of available data the classification criteria are not met.

Toxic action and other harmful actions for human body:

Arsenic and arsenic compounds act toxically on the circulatory system, central and peripheral nervous system, liver, kidneys. Prolonged exposure to arsenic (III) oxide and its salts leads to neoplasms of skin, lungs, kidneys, liver, and sometimes bladder. Nickel causes disorders in the nucleic acid structure leading to neoplasms of mouth, fauces and lungs as well as nickel eczema.

Additional information:

Information related to possible exposure ways, product properties related symptoms and possible product exposure effects described in section 4.2.

SECTION 12. Ecological information

12.1. Toxicity:

On the basis of Chemical Safety Report for nickel (II) sulfate (VI) the product meets classification criteria as very toxic to aquatic life (Aquatic Acute 1; H400) and very toxic to aquatic life with long lasting effects (Aquatic Chronic 1; H410).

M factor for nickel (II) sulfate (VI) = 1.

Toxic concentration for aqueous animal and plant organisms:

NiSO₄:

LC₅₀/96h fish: *Oncorhynchus mykiss*: 15.3 mg/l

EC₅₀/48h crustaceans: *Ceriodaphnia dubia*: > 82.1 < 133.1 mg/l (depending on water hardness and alkalinity)

EC₅₀/72h algae: *Pseudokirchnerella subcapitata*: > 81.5 < 148 µg/l (depending on water hardness and pH)

H₂SO₄:

LC₅₀/96h fish: *Lepomis macrochirus*: > 16 < 28 mg/l

EC₅₀/48h crustaceans: *Daphnia magna*: 100 mg/l

EC₅₀/72h algae: *Desmodesmus subspicatus*:

H₃AsO₄:

LC₅₀/96h fish: *Cyprinodon variegatus*: 28 mg/l

EC₅₀/48h crustaceans: *Americamysis bahia*: 6.6 mg/l

EC₅₀/72h algae: no data

Predicted no effect concentrations (PNECs):

PNEC (surface water) – 3.6 µg soluble Ni/l

PNEC (marine water) – 8.6 µg soluble Ni/l

PNEC (soil) – 29.9 mg Ni/kg dry mass

PNEC (STP) – 0.33 mg Ni/l

PNEC birds, oral – 5.0 mg/kg wet mass

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PNEC mammals, oral (rat) – 0.73 mg/kg wet mass

12.2. Persistence and degradability:

Product dissolves in contact with surface water. Environmental changes last until ions of Ni⁺² react with ions of S⁻², CO₃⁻² and precipitation of their sparingly soluble salts.

12.3. Bioaccumulative potential:

Nickel is easily bioaccumulated in phytoplankton and in other water plants. Daily human absorption varies in a range of 0,3-0,5 mg. Alimentary tract absorption in humans is below 10%. Low solubility compounds (metallic nickel dust, nickel sulfate and oxide) accumulate in lungs. Nickel sulfate solution is absorbed at 55-75% from skin in 24 hours. Nickel acquired with food and water is poorly absorbed and quickly excreted from organism. It is accumulated mainly in bones, parenchymal organs, heart and various glands. Nickel from the air is highly accumulated in lungs and transported to other organs.

12.4. Mobility in soil:

Nickel is an element with high mobility in the natural environment, the system soil - plant plays an important role in its circulation in ecosystems. Cultivated plants differ in ability to absorb nickel, although it is usually easily absorbed proportionally to the concentration in the soil until it reaches toxic levels. Nickel as a micronutrient in trace amounts is essential for plants. However, there are large differences in phytoaccumulation and phytotoxicity of nickel, depending on plant species, as well as the form in which nickel is present in the soil. Very important are also properties of soil such as pH, particle size distribution, organic matter content, as well as the interaction between nickel and other trace elements, e.g. cadmium (Cd), copper (Cu), zinc (Zn).

12.5. Results of PBT and vPvB assessment: Product not classified as PBT and vPvB.**12.6. Other adverse effects:** Not known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Destruction and neutralization: Do not dispose of to the sewage system. Do not let the substance to contaminate surface and underground water and soil. Do not dispose of together with municipal waste. Consider the opportunity to reuse. Store the waste on hazardous waste dump yards in tight and durable containers.

Waste management according to the Directive of the European Parliament and Council 2008/98/EC of November 19th, 2008 on waste (Official Journal EC L 312 of 22.11.2008).

Packages: Disposable packages must be handed over to an authorized collector of package waste. Multiple use packages can be still used after previous cleaning.

Waste management according to the Directive of the European Parliament and Council 94/62/EC of December 20th, 1994 on packages and waste packages (Official Journal EC L 365 of 31.12.1994, with subsequent amendments).

SECTION 14: Transport information

14.1. UN number: 2923**14.2. UN proper shipping name:****ADR:** CORROSIVE MATERIAL, SOLID, TOXIC, N.O.S**RID:** CORROSIVE MATERIAL, SOLID, TOXIC, N.O.S**14.3. Transport hazard class(es):** 8 / CT2

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14.4. Packing group: III

14.5. Environmental hazards:

Due to toxic effects on aquatic organisms, means of transport should be labelled with the following pictogram: "dead tree / dead fish"

14.6. Special precautions for user: Do not damage the containers. In case of unintentional product release, liquidate the leakage (seal, place damaged container in a protective packaging). Collect spilt substance into an acid resistant tank and dispose of as hazardous waste. Personal protection measures as described in section 8.8.2.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: n/a

Material trade name: Nickel sulphate

Limited quantities: LQ24/E1

Means of transport labelling: Warning label no. 8, 6.1 and Symbol: "Dead tree / dead fish"

Special provisions: 274



Packing instructions:

- **ADR:** P002, IBC08,
- **RID:** P002, DPPL08,

Hazard identification number: 86

Other data: contains up to 10% of H₂SO₄

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Nickel(II) sulfate(VI) is not covered by the regulations of the Decree (EC) No. 2037/2000 of the European Parliament and Council of 29th June, 2000 on substances depleting ozone layer (Official Journal L 244 of 29.09.2000, with subsequent amendments) or the Decree (EC) No. 850/2004 of the European Parliament and Council of April 29th, 2004, on permanent organic contamination and changing the Directive 79/117/EWG (Official Journal L 158 of 30.4.2004, with subsequent amendments).

Nickel(II) sulfate(VI) is not subject to regulations of the Decree of the European Parliament and Council (EC) No. 689/2008 of June 17th, 2008 on export and import of hazardous chemicals (Official Journal L 204 of 31.07.2008, with subsequent amendments).

Category of the substance according to Seveso Directive/substances listed in the annex I to the Directive of the Council 96/82/EC of December 9th, 1996, on control of significant breakdowns hazard related to hazardous substances (Official Journal L 192, 08/07/1998, with subsequent amendments): dangerous for the environment.

Nickel compounds are listed in the Annex X to the Decision No. 2455/2001/EC of the European Parliament and Council of November 20th, 2001, establishing the list of priority substances within the scope of water policy, changing the Directive 2000/60/EC (Official Journal L 331, 15/12/2001).

Provisions of law:

The Act of 25 February 2011 on chemical substances and their mixtures (Official Journal 11.63.322); Regulation (EC) No 1907/ 2007 of the European Parliament and Council of December 18th, 2006 on Registration, Evaluation, Authorisation and Restriction of Chemical substances (REACH), creating European Chemicals Agency, changing the Directive 1999/ 45/ EC as well as revoking the Council (EC) decree No 793193/ 93 as well as the Commission Directive (EC) No 1488/94 as well as the Council Directive 76/769/EWG and Council Directive 91/155/EEC, 93/67/EEC, 93/105/EC and 2000121/21/EC (Official Journal EC L 136 of 29.05.2007 with subsequent amendments); Regulation of the European Parliament and Council (EC) No. 1272/2008 dated December 16th, 2008 on classification, marking and packing hazardous substances and mixtures, changing and revoking the Directive 67/548/EWG and 1999/45/EWG as well as changing the Decree (EC) No. 1907/2006 (Official Journal EC L 353 of 31.12.2008 with subsequent amendments); Commission Regulation (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (OJ L 133, with subsequent amendments); Regulation of the European Parliament and Council Regulation (EC) No 1336/2008 of 16 December 2008 amending Regulation (EC) No 648/2004 in order to adapt it to Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures (Official Journal. EU L 354 of 31 December 2008); Decree of the Minister of Labour and Social Policy of November 29th, 2002 on the highest allowable concentrations and intensities of substances harmful for health in the work environment (Official Journal 02.217.1833, with subsequent amendments); Act of August 19th, 2011 on transportation of hazardous goods (Official Journal 1367 2012.01.01); Act of December 14th, 2012, on waste (Official Journal 0.21.2013); Act of June 13th, 2013, on packages and packages waste (Official Journal 0.888.2013); Decree of the Board of Ministers of August 24th, 2004, on the list of works banned for adolescents and conditions of their employing for some works. (Official Journal 04.200.2047, with subsequent amendments); Decree of the Board of Ministers of September 10th, 1996 on the list of works banned for women (Official Journal No. 114, item 545, with subsequent amendments).

15.2. Chemical safety assessment

Chemical safety assessment of the nickel(II) sulfate(VI) has been carried out. The Chemical Safety Report is available at KGHM Polska Miedź S.A.

SECTION 16: Other information

R and H phrases which have not been given in whole in sections 2-15:

R23/25 - Toxic by inhalation and if swallowed.

R35 - Causes severe burns.

R38 - Irritating to skin.

R49 - May cause cancer by inhalation.

H301 - Toxic if swallowed.

H315 - Causes skin irritation.

H318 - Causes serious eye damage.

H331 - Toxic if inhaled.

H350i - May cause cancer by inhalation.

Explanations of abbreviations and acronyms used in the MSDS:

CAS number – means numerical identification assigned to chemical substance by the American organization named Chemical Abstract Service (CAS), enabling substance identification.

EC number – the number assigned to chemical substance in EINECS -. European Inventory of Existing Chemical Substances, or the number assigned to chemical substance in ELINCS – European List of Notified Chemical Substances or the number in chemical substances inventory included in “No-longer polymers” document.

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Index number – it is an identification code given in part 3 of the annex VI to the Regulation of the European Parliament and Council (EC) No. 1272/2008 dated December 16th, 2008, on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006;

Registration number – number given by ECHA after substance/intermediate registration by the manufacturer/importer according to REACH Regulation.

NOEC – no observed effect concentration – the concentration of a pollutant that will not harm the species involved, with respect to the effect that is studied.

LOEC – lowest observed effect concentration expressed in mg/litre.

EC₅₀ – effect concentration - substance concentration expressed in milligrams per litre causing the given pharmacological effect (e.g. inhibition of growth) at 50% of the examined population within specified time.

LD₅₀ – lethal dose - dose of toxic substance expressed in milligrams per kilogram of body mass necessary to kill 50% of the examined population within specified time.

LC₅₀ – lethal concentration - concentration of a substance in the inhaled air, expressed in milligrams per litre, which causes death of 50% of the examined population after specified period of exposure.

TLV-TWA – the highest admissible concentration/threshold limit value – weighted average value – concentration of toxic chemical whose impact on a worker during 8-hour daily shift and average weekly time of work provided in the Labour Code during the period of his occupational activity should not cause negative changes of his health condition and of health condition of his next generations.

TLV-STEL – the highest admissible short term concentration/short term exposure limit – weighted average of concentration of the specified, toxic chemical compound which should not cause negative changes of a worker's health if present in the work environment for not longer than 15 minutes and not more often than twice per shift with occurrences separated by more than 1 hour. and not more often than twice per shift with occurrences separated by more than 1 hour.

TVL-C – threshold limit value - ceiling limit – concentration value that should not be exceeded at any time at the work environment because of health or life hazard

IARC - International Agency for Research on Cancer – a WHO department located in Lyon, France, dealing with classification of carcinogenic agents and substances.

Necessary training: Post-related training within the scope of safe use of a substance considering its hazardous properties for human and the environment.

Sources of information used during preparation of the MSDS:

- Own results of qualitative and quantitative analyses of nickel sulphate;
- Dangerous Substances Practical Handbook ALFA-WEKA;
- Dangerous substances safety data sheets (nickel sulphate) POCH;
- European Chemical Substance Information System;
- Technology Encyclopedia CHEMISTRY. WNT;
- CHEMISTRY structure and reactions. Milton K.Snyder;
- Chemical Safety Report for nickel(II) sulphate(VI), 2010;

All the data are based on the current state of our knowledge. Receivers of our product must take into consideration existing legal regulations and other legislation.

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The present data sheet is the property of KGHM Polska Miedź S.A. "Legnica" Copper Smelter & Refinery and characterizes our product exclusively.

Further information can be obtained: under the telephone numbers listed in section 1.

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