

Nickel sulphate

Date of issue: 05.08.2003

Revision No./Revision date: 12 / 08.01.2015

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

1.1 Product identifier:**Trade name:** nickel sulphate**Synonyms:** technical (crude) nickel sulphate**UN-No.:** 3260**1.2 Relevant identified uses of the substance or mixture and uses advised against**Identified uses: production of pure nickel(II) sulphate(VI).Uses advised against: product cannot be publically available**1.3 Details of the supplier of the material safety data sheet:**

KGHM Polska Miedź S.A.

"Głogów" Copper Smelter & Refinery

ul. Żukowicka 1

67-200 Głogów

Person responsible for preparing the MSDS: Agnieszka Piechota, phone No.: (+48 76) 76) 747 71 76,
e-mail: a.piechota@kghm.pl**1.4. Emergency telephone number:****Emergency contact during transport (in English): (+48) 607 268 497 – available 24/7**

Manufacturer (Poland): (+48 76) 747 65 01 – available 24/7

Fire Department (Poland): (+48) 998 – available 24/7

General European Emergency Number: 112 – available 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 effectsClassification 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;**C; R 34** - causes burns;

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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.**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**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

3.1. Substances

n/a

3.2. Mixtures

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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 registration number |
|-----|---|-----------|-----------|--------------|------------------------------|---|---|--|
| 1. | Nickel(II) sulphate(VI) $\text{NiSO}_4 \times n \text{H}_2\text{O}$ (n = 1, 3, 4) | 7786-81-4 | 232-104-9 | 028-009-00-5 | $88 \leq c \leq 96$ | 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- 211943936 1 44-0003 |
| 2. | Sulphuric acid(VI) H_2SO_4 | 7664-93-9 | 231-639-5 | 016-020-00-8 | $c \leq 10$ | Skin. Corr. 1A | H314 | 01- 211945883 8 20-0041 |
| 3. | Arsenic(III) oxide As_2O_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) $\text{NiSO}_4 \times n \text{H}_2\text{O}$ (n = 1, 3, 4) | 7786-81-4 | 232-104-9 | 028-009-00-5 | $88 \leq c \leq 96$ | Carc., cat. 1 Repro. cat. 2; Muta. cat.3; T; Xn, Xi; N | 49-61- 20/22-38- 42/43- | 01- 211943936 1 44-0003 |
| 2. | Sulphuric acid(VI) H_2SO_4 | 7664-93-9 | 231-639-5 | 016-020-00-8 | $c \leq 10$ | C | 35 | 01- 211945883 8 20-0041 |
| 3. | Arsenic(III) oxide As_2O_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 |

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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:

Respiratory ways: Take the victim out of the place of exposure. Provide calmness in semi-sitting or sitting position. Protect against loss of body heat. **Immediate medical help necessary.**

Contact with eyes: Immediately rinse with a lot of cool, running water, for about 15 minutes, with eyelid open. Avoid intensive water jet because conjunctiva may become mechanically damaged.

Immediate medical help necessary.

Skin contact: Remove contaminated clothing. Immediately clean contaminated skin with a lot of running water at room temperature. In case of skin changes, seek dermatologist attention.

Alimentary way: Rinse mouth with water. Have the victim drink 2 glasses of water. If the vomiting is self-induced, rinse mouth with water and drink water again. **Immediate medical help necessary.**

General guidelines: Persons endangered to eye intoxication should be instructed about the necessity and method of immediate eye-rinsing.

Note: aqueous solutions have acid reaction, pH of 10% of aqueous solution is about 1.

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.

Long-term exposure:

Long-term exposure to sulfuric acid may lead to chronic inflammation of conjunctivas, nose bleeding, chronic bronchi inflammation. Repeated exposure of skin may lead to ulceration, changes in nails.

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

If the victim is unconscious, make sure that the respiratory tract is not obstructed and place the victim in a recovery position. Provide medical assistance.

SECTION 5. Firefighting measures

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5.1 Extinguishing media:

Suitable extinguishing media: Non-flammable substance. Apply extinguishing media proper for the surrounding materials: 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:

Substance soluble in water, creating caustic solutions which when in contact with most of metals release extremely flammable hydrogen.

Hazardous decomposition products: at high temperatures, sulphuric acid is distilled off and decomposition takes place releasing toxic sulphur oxides vapours (SO₂, SO₃), dusts of nickel oxides and arsenic trioxide.

5.3 Advice for fire-fighters:

During fire harmful substances may form. Wear protective, gas-tight clothes and apparatus isolating respiratory ways.

Additional information: Notify those in the surroundings about the fire. Remove all personnel not participating in the breakdown liquidation procedure from the area of hazard. Call fire department or police department. If possible, remove containers from fire hazard area. Do not let the fire water, contaminated with the substance, to penetrate surface or underground water.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

6.1.1 For non-emergency personnel: Do not inhale dusts. Avoid direct contact. In case of choosing evacuation route consider the direction of the dust/fume movement.

6.1.2 For emergency responders: Avoid dust generation, do not inhale dusts. Avoid direct contact. Apply clothing protecting against chemicals as well as eye protection. In case of dust formation, wear dust mask.

Additional information:

Notify those in the surroundings about the emergency. Remove all personnel not participating in the breakdown liquidation procedure from the area of hazard. Call fire department and police if necessary. Protect the spilt substance against rain and wind by covering it with canvas cover.

6.2 Environmental precautions:

Do not let the product penetrate the sewage system, ground and surface waters and soil. In case of accident, protect the substance against release to the environment. Collect maximum quantity to proper containers in order to utilize it.

6.3 Methods and material for containment and cleaning up:

Liquidate the leak (seal the defective package and put it in the protective package). Collect the spilt substance to container (acid-resistant) and dispose of as hazardous waste. Procedure with waste according to section 13.

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

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7.1 Precautions for safe handling:

Avoid generation of vapour/dust within the work stand. When handling the substance, do not drink, eat, smoke; avoid contact with the substance and its solutions. During work, apply eye and skin protection. Work stand should be equipped with eyewash. Work stand should be equipped with means for collecting spilt substance. After work, thoroughly clean hands and face.

7.2 Conditions for safe storage, including any incompatibilities:

Store in properly identified and tight acid resistant containers. Protect the container against damage. Keep the substance in roofed place with impermeable floor; if there is no roof, the substance must be protected against atmospheric precipitation with foil. Properly identify the storage place with access for authorized, trained personnel only.

Ventilation requirements: Premises must be equipped with proper local exhaust ventilation with housing in the area of vapours/dust emission to aerial environment and with general ventilation of the room. In case of insufficient ventilation, wear suitable individual protection of the respiratory system. 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 | - |

(1) Thoracic fraction - an aerosol fraction penetrating into the respiratory tract in the chest, which poses a risk to the health after deposit in the trachea and bronchial gas exchange area.

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 | 7664-93-9 | 0.2 (ACGIH-TWA, USA) 1 (OSHA-PEL, USA) 0.2 (HTP, Finland) | 3 (ACGIH-TWA, USA) - 1 (HTP, Finland) |

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| | | | | |
|----|---|---|---|------------------------|
| | Sulphuric acid (vapours) ⁽¹⁾⁽²⁾ | | 0.1(MAK-Wert, Germany) 0.05 (European Union) | 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:

Decree 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/EEG 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 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 = 16mg 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,

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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: dark-yellow or yellow-green, fine-crystalline powder;

Odour: odourless;

Level of odour perception: n.a.

pH of saturated solution: about 1;

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

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: n.a.

Bulk density: 1.88 g/cm³;

Solubility in water: at temp. 20 °C - about 1,5 g/100 g of water;

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

Spontaneous ignition temperature: n.a.

9.2 Other information:None

SECTION 10. Stability and reactivity

10.1. Reactivity:

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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, accidental incompatible materials contact.

10.5 Incompatible materials:

Alkali and alkali soil metals - cause heating up, ignition of metal and explosion of released hydrogen. Contact with strong bases causes heating up of the mix and decomposition of NiSO₄ to nickel (II) hydroxide.

10.6 Hazardous decomposition products:

In case of heating up to higher temperatures or fire, the following toxic products of decomposition are released: sulphur oxides (SO₂, SO₃), nickel oxides, arsenic oxides.

SECTION 11. Toxicological information

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

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

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):

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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/kgLD₅₀ (rabbit/females, skin): 1750 mg/kg**b) Skin corrosion/irritation:**

due to pH of the product it is 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 it is 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 is 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 is classified as:

Muta. 2; H341 - suspected of causing genetic defects

f) Carcinogenicity:due to H₃AsO₄ content above concentration limit the product is classified as:

Carc. 1A; H350 - may cause cancer

g) Reproductive toxicity:due to NiSO₄ content above concentration limit the product is classified as:

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

h) Specific target organ toxicity — Single exposure:

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 are toxic for circulatory system, central and peripheralnervous system, liver and kidneys. Nickel causes disorders in the structure of nucleic acid leading to tumours of mouth, throat and lungs as well as nickel egzema.

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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

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

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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 is not classified as PBT and vPvB.

12.6. Other adverse effects:

Not known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Do not dispose of to 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).

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: 3260**14.2. UN proper shipping name:**

- ADR: CORROSIVE, SOLID, ACIDIC, INORGANIC, N.O.S.
- RID: CORROSIVE, ACIDIC, INORGANIC, SOLID, N.O.S.

14.3. Transport hazard class(es): RID/ADR: 8; IMDG: 8**14.4. Packing group:** RID/ADR: III; IMDG: III,**14.5. Environmental hazards:**

Due to toxic effects on aquatic organisms, means of transport should be labelled with the following pictogram:



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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

Additional information:**Trade name:** Nickel sulphate**Class/Classification Code:** RID/ADR: C2,**Limited quantities:** RID/ADR 5 kg**Packing instructions:**

- ADR: P002, IBC08, LP02, R001,
- RID: P002, DPPL08, LP02, R001,
- IMDG: P002, IBC08.

Warning labels: RID/ADR: 8, IMDG: 8**Hazard identification number:** RID/ADR: 80**Special provisions:** RID/ADR: 274; IMDG: 223, 274, 944**Other data:** special provisions of 5.2.1.8 and 5.4.1.1.18 apply.

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

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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. Copper Chemical Safety Report is available at KGHM Polska Miedź S.A. "Głogów" Copper Smelter & Refinery.

SECTION 16: Other information

Amendments have been made to following sections: 1.4 – emergency telephone number has been changed.

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.

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,

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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;

WE 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.

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

UN number – unequivocal marking of hazardous substances and goods assigned by United Nations Central Committee to provide international recognition and use.

IUPAC name – name of a substance given by IUPAC - International Union of Pure and Applied Chemistry Committee

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.

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.

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.

Sources of information used during preparation of the MSDS:

- Own results of qualitative and quantitative analyses of technical (crude) nickel sulphate;
- Chemical Safety Report for nickel (II) sulfate(VI); 2010;
- European Chemical Substance Information System (<http://ecb.jrc.ec.europa.eu/esis/>);
- TOXNET – Toxicology Data Network (<http://toxnet.nlm.nih.gov/>);
- ChemPortal - The Global Portal to Information on Chemical Substances (<http://webnet3.oecd.org/eChemPortal/Home.aspx>);
- *Encyclopedia of technology, vol. Chemistry*, Publ. WNT, Warsaw, 1965r.
- *„CHEMYSTRY structure & reactions”*, Milton K. Synder, Science Technology Publ., Warsaw, 1975r.
- *“Encyclopaedia of technology”, vol. Chemistry, rev. N-T. Wyd. WNT, Warszawa, 1965r.*
- *„Assessment of health risk of Wiślinka inhabitants related to impact of phosphogypsum dump”, Marek Biesiada i in., Instytut Medycyny Pracy i Zdrowia Środowiskowego; Sosnowiec,*

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2006.

- „Nickel content and absorption by plants at various pH of natural soils and contaminated with cadmium or lead”, Jolanta Domańska, Ochrona Środowiska i Zasobów Naturalnych nr 40, 2009 r.

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

Information contained in the material safety data sheet is to describe the product within the scope of safety requirements. User is responsible for taking any steps in order to meet the provisions of the national law and to create safe conditions for use of the product. User is held responsible for effects resulting from improper application of this product.

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