SAFETY DATA SHEET

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

1.1 Product identifiers

Product name : Nickel(II) chloride hexahydrate
Product Number : 223387
Brand : SIGALD
CAS-No. : 7791-20-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES
Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315
Respiratory sensitization (Category 1), H334
Skin sensitization (Category 1), H317
Germ cell mutagenicity (Category 2), H341
Carcinogenicity, Inhalation (Category 1A), H350
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), Lungs, H372
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410
2.2 **GHS Label elements, including precautionary statements**

**Pictogram**

<table>
<thead>
<tr>
<th>Signal Word</th>
<th>Danger</th>
</tr>
</thead>
</table>

**Hazard statement(s)**

- H301 + H331: Toxic if swallowed or if inhaled.
- H315: Causes skin irritation.
- H317: May cause an allergic skin reaction.
- H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H341: Suspected of causing genetic defects.
- H350: May cause cancer by inhalation.
- H360: May damage fertility or the unborn child.
- H372: Causes damage to organs (Lungs) through prolonged or repeated exposure if inhaled.
- H410: Very toxic to aquatic life with long lasting effects.

**Precautionary statement(s)**

- P201: Obtain special instructions before use.
- P202: Do not handle until all safety precautions have been read and understood.
- P260: Do not breathe dust.
- P264: Wash skin thoroughly after handling.
- P270: Do not eat, drink or smoke when using this product.
- P271: Use only outdoors or in a well-ventilated area.
- P272: Contaminated work clothing must not be allowed out of the workplace.
- P273: Avoid release to the environment.
- P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.
- P285: In case of inadequate ventilation wear respiratory protection.
- P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
- P304 + P340 + P311: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
- P308 + P313: IF exposed or concerned: Get medical advice/ attention.
- P333 + P313: If skin irritation or rash occurs: Get medical advice/ attention.
- P342 + P311: If experiencing respiratory symptoms: Call a POISON CENTER/ doctor.
- P362: Take off contaminated clothing and wash before reuse.
- P391: Collect spillage.
- P403 + P233: Store in a well-ventilated place. Keep container tightly closed.
- P405: Store locked up.
- P501: Dispose of contents/ container to an approved waste disposal plant.

2.3 **Hazards not otherwise classified (HNOC) or not covered by GHS** - none
SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel(II) chloride hexahydrate</td>
<td>Acute Tox. 3; Skin Irrit. 2; Resp. Sens. 1; Skin Sens. 1; Muta. 2; Carc. 1A; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H301, H331, H315, H334, H317, H341, H350, H360, H372, H400, H410</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Concentration limits:
- >= 1 %: STOT RE 1, H372; 0.1 - < 1 %: STOT RE 2, H373; >= 20 %: Skin Irrit. 2, H315; >= 0.01 %: Skin Sens. 1, H317;
- M-Factor - Aquatic Acute: 1 - Aquatic Chronic: 1

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.
If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas
Nickel/nickel oxides
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.
6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Hygroscopic.

Storage class
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel(II) chloride hexahydrate</td>
<td>7791-20-0</td>
<td>TWA</td>
<td>1 mg/m3</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>0.1 mg/m3</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Remarks</td>
<td>Not classifiable as a human carcinogen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>0.015 mg/m3</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Potential Occupational Carcinogen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada

### Biological occupational exposure limits

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel(II) chloride hexahydrate</td>
<td>7791-20-0</td>
<td>Nickel</td>
<td>5 µg/l</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
</tbody>
</table>

**Remarks**
End of shift at end of workweek

<table>
<thead>
<tr>
<th>Component</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td></td>
<td>30 µg/l</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
</tbody>
</table>

**Remarks**
End of shift at end of workweek

### 8.2 Exposure controls

**Appropriate engineering controls**
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

**Skin protection**
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

- **Full contact**
  - Material: Nitrile rubber
  - Minimum layer thickness: 0.11 mm
  - Break through time: 480 min
  - Material tested: KCL 741 Dermatril® L

- **Splash contact**
  - Material: Nitrile rubber
  - Minimum layer thickness: 0.11 mm
  - Break through time: 480 min
  - Material tested: KCL 741 Dermatril® L

**Body Protection**
protective clothing
Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: crystalline
   Color: green

b) Odor
   odorless

c) Odor Threshold
   Not applicable

d) pH
   4.9 at 100 at 20 °C (68 °F)

e) Melting point/freezing point
   Melting point: 1,001 °C (1,834 °F) - (anhydrous substance), decomposes

f) Initial boiling point and boiling range
   No data available

 g) Flash point
    () Not applicable

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   The product is not flammable.

j) Upper/lower flammability or explosive limits
   No data available

k) Vapor pressure
   No data available

l) Vapor density
   No data available

m) Density
   1.92 g/cm³
   Relative density
   No data available

n) Water solubility
   2,540 g/l at 20 °C (68 °F) - soluble

o) Partition coefficient: n-octanol/water
   Not applicable for inorganic substances

p) Autoignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available
t) Oxidizing properties  none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Alkali metals

10.4 Conditions to avoid
Avoid moisture.
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - 175 mg/kg
(OECD Test Guideline 401)
Remarks: (anhydrous substance)
The value is given in analogy to the following substances: nickel(II) chloride
LC50 Inhalation - Rat - male - 4 h - 0.593 mg/l - dust/mist
(OECD Test Guideline 403)
Remarks: (anhydrous substance)
The value is given in analogy to the following substances: nickel(II) chloride
Dermal: No data available

Skin corrosion/irritation
Remarks: Causes skin irritation.
(anhydrous substance)
The value is given in analogy to the following substances: nickel(II) chloride

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 168 h
(OECD Test Guideline 405)
Remarks: (anhydrous substance)
The value is given in analogy to the following substances: nickel(II) chloride
Remarks: slight irritation

**Respiratory or skin sensitization**
May cause allergic respiratory and skin reactions (anhydrous substance)

**Germ cell mutagenicity**
Suspected of causing genetic defects.
Test Type: gene mutation test
Test system: mammalian cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: positive
Test Type: Ames test
Test system: Salmonella typhimurium
Result: negative
Remarks: (Lit.)

Test Type: Chromosome aberration test
Species: Mouse
Application Route: Intraperitoneal
Result: positive
Remarks: (ECHA)

**Carcinogenicity**
Positive evidence from human epidemiological studies (inhalation)
IARC: 1 - Group 1: Carcinogenic to humans (Nickel(II) chloride hexahydrate)
NTP: Known - Known to be human carcinogen (Nickel(II) chloride hexahydrate)
OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

**Reproductive toxicity**
May damage the unborn child.

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
Inhalation - Causes damage to organs through prolonged or repeated exposure.
- Lungs
The value is given in analogy to the following substances: nickel(II) chloride

**Aspiration hazard**
No data available

11.2 Additional Information
RTECS: QR6480000
Gastrointestinal disturbance
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
The following applies to soluble nickel compounds in general: inorganic nickel has an adstringent effect on mucous membranes. Sensitisation with allergic manifestations is possible in predisposed persons. In some cases nickel dermatitis may manifest itself. Depending on the water-solubility, nickel and its compounds display a more or less distinct carcinogenicity, with the readily soluble nickel compounds obviously entailing the lesser risk.

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

### SECTION 12: Ecological information

#### 12.1 Toxicity

**Toxicity to fish**

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Substance Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>semi-static test</td>
<td>LC50 - Oncorhynchus mykiss (rainbow trout) - 15.3 mg/l - 96 h</td>
</tr>
<tr>
<td>Remarks</td>
<td>(ECHA)</td>
</tr>
<tr>
<td></td>
<td>(anhydrous substance)</td>
</tr>
<tr>
<td></td>
<td>The value is given in analogy to the following substances: nickel(II) chloride</td>
</tr>
</tbody>
</table>

**Toxicity to daphnia and other aquatic invertebrates**

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Substance Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>static test</td>
<td>LC50 - Ceriodaphnia dubia (water flea) - 0.013 mg/l - 48 h</td>
</tr>
<tr>
<td>Remarks</td>
<td>(ECHA)</td>
</tr>
<tr>
<td></td>
<td>(anhydrous substance)</td>
</tr>
<tr>
<td></td>
<td>The value is given in analogy to the following substances: nickel(II) chloride</td>
</tr>
</tbody>
</table>

**Toxicity to algae**

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Substance Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>static test</td>
<td>ErC50 - green algae - 0.243 mg/l - 72 h</td>
</tr>
<tr>
<td>Remarks</td>
<td>(OECD Test Guideline 201)</td>
</tr>
<tr>
<td></td>
<td>(anhydrous substance)</td>
</tr>
<tr>
<td></td>
<td>The value is given in analogy to the following substances: nickel(II) chloride</td>
</tr>
</tbody>
</table>

**Toxicity to fish (Chronic toxicity)**

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Substance Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>flow-through test</td>
<td>LC50 - Cyprinodon variegatus (sheepshead minnow) - 27.8 mg/l - 28 d</td>
</tr>
<tr>
<td>Remarks</td>
<td>(ECHA)</td>
</tr>
<tr>
<td></td>
<td>(anhydrous substance)</td>
</tr>
</tbody>
</table>

**Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)**

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Substance Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>semi-static test</td>
<td>NOEC - Hyalella azteca (Amphipod) - 0.029 mg/l - 14 d</td>
</tr>
<tr>
<td>Remarks</td>
<td>(ECHA)</td>
</tr>
<tr>
<td></td>
<td>(anhydrous substance)</td>
</tr>
</tbody>
</table>
12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3288  Class: 6.1  Packing group: III
Proper shipping name: Toxic solid, inorganic, n.o.s. (Nickel(II) chloride hexahydrate)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3288  Class: 6.1  Packing group: III  EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, INORGANIC, N.O.S. (Nickel(II) chloride hexahydrate)
Marine pollutant: yes

IATA
UN number: 3288  Class: 6.1  Packing group: III
Proper shipping name: Toxic solid, inorganic, n.o.s. (Nickel(II) chloride hexahydrate)

SECTION 15: Regulatory information

SIGALD - 223387

The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada
SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel(II) chloride hexahydrate</td>
<td>7791-20-0</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel(II) chloride hexahydrate</td>
<td>7791-20-0</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel(II) chloride hexahydrate</td>
<td>7791-20-0</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel(II) chloride hexahydrate</td>
<td>7791-20-0</td>
<td>2007-09-28</td>
</tr>
</tbody>
</table>

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact misbranding@sial.com.

Version: 6.7 Revision Date: 05/25/2023 Print Date: 09/23/2023