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

1.1 Product identifiers
Product name: Selenium
Product Number: 229865
Brand: Aldrich
Index-No.: 034-001-00-2
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 7782-49-2

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture 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
Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Specific target organ toxicity - repeated exposure (Category 2), H373
Long-term (chronic) aquatic hazard (Category 4), H413

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

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word  Danger

Hazard statement(s)
H301 + H331  Toxic if swallowed or if inhaled.
H373  May cause damage to organs through prolonged or repeated exposure.
H413  May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P260  Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264  Wash skin thoroughly after handling.
P273  Avoid release to the environment.
P301 + P310  IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P304 + P340 + P311  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P314  Get medical advice/ attention if you feel unwell.

Supplemental Hazard Statements
none

Reduced Labeling (<= 125 ml)

Pictogram

Signal word  Danger

Hazard statement(s)
H413  May cause long lasting harmful effects to aquatic life.
H301 + H331  Toxic if swallowed or if inhaled.

Precautionary statement(s)
P264  Wash skin thoroughly after handling.
P301 + P310  IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P304 + P340 + P311  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.

Supplemental Hazard Statements
none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula: Se
Molecular weight: 78.96 g/mol
CAS-No.: 7782-49-2
EC-No.: 231-957-4
Index-No.: 034-001-00-2
### 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

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### 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
Selenium/selenium 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**
Change contaminated clothing. Preventive skin protection recommended. Wash hands 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.
Store under inert gas.

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

8.2 Exposure controls

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

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).

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.
Recommended Filter type: Filter type P3

The entrepreneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

**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: powder
   Color: light gray

b) Odor
   No data available

c) Odor Threshold
   No data available

d) pH
   No data available

e) Melting point/freezing point
   Melting point/range: 217 °C - lit.

f) Initial boiling point and boiling range
   684,9 °C - lit.

g) Flash point
   Not applicable

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

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

k) Vapor pressure
   > 0,001 hPa at 20 ºC

l) Vapor density
   No data available

m) Density
   4,81 g/cm³ at 25 °C - lit.
   Relative density 4,8 at 25 ºC

n) Water solubility
   0,1 g/l at 20,9 ºC - insoluble

o) Partition coefficient: n-octanol/water
   log Pow: 5Not applicable for inorganic substances

p) Autoignition temperature
   220 - 250 ºC
   at 1.013,25 hPa - Relative self-ignition temperature for solids

q) Decomposition temperature
   No data available

r) Viscosity
   Viscosity, kinematic: No data available
   Viscosity, dynamic: No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

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
Risk of explosion with:
alkali amides
Metals
Oxygen
amides
cadmium
Potassium
sodium
nitrogen oxides
Tin
nitrogen trichloride
Risk of ignition or formation of inflammable gases or vapours with:
carbides
peroxi compounds
halogen-halogen compounds
halogen oxides
Fluorine
lithium silicide
barium peroxide
Uranium
Generates dangerous gases or fumes in contact with:
hydrochloric acid
sulfuric acid
Exothermic reaction with:
powdered aluminium
Beryllium
bromates
chromium(VI) oxide
chlorates
Nickel
Oxidizing agents
phosphorus
platinum
Nitric acid
silver oxide
Zinc
Alkali metals

10.4 Conditions to avoid
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**
- Acute toxicity estimate Oral - Expert judgment - 100,1 mg/kg
- Symptoms: Gastrointestinal disturbance
- Acute toxicity estimate Inhalation - Expert judgment - 4 h - 0,51 mg/l
- Dermal: No data available

**Skin corrosion/irritation**
- Skin - reconstructed human epidermis (RhE)
- Result: No skin irritation
  (OECD Test Guideline 431)

**Serious eye damage/eye irritation**
- Eyes - Bovine cornea
- Result: No eye irritation - 4 h
  (OECD Test Guideline 437)

**Respiratory or skin sensitization**
- Local lymph node assay (LLNA) - Mouse
- Result: negative
  (OECD Test Guideline 429)

**Germ cell mutagenicity**
- Test Type: Ames test
- Test system: Salmonella typhimurium
- Metabolic activation: with and without metabolic activation
- Method: OECD Test Guideline 471
- Result: negative

Test Type: Chromosome aberration test
- Species: Mouse
- Cell type: Bone marrow
- Application Route: Intraperitoneal

Result: negative
Remarks: (ECHA)

**Carcinogenicity**
- No data available

**Reproductive toxicity**
- No data available

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

**Specific target organ toxicity - repeated exposure**
- May cause damage to organs through prolonged or repeated exposure.
  Aspiration hazard
- No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 13 Weeks - NOAEL (No observed adverse effect level) - 0,4 mg/kg
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances: Sodium selenite
RTECS: VS7700000
anemia, Vomiting, Diarrhea, Cough, Difficulty in breathing, Acute selenium poisoning produces central nervous system effects, which include nervousness, convulsions, and drowsiness. Other signs of intoxication can include skin eruptions, lassitude, gastrointestinal distress, teeth that are discolored or decayed, odorous ("garlic") breath, and partial loss of hair and nails. Chronic exposure by inhalation can produce symptoms that include pallor, coating of the tongue, anemia, irritation of the mucosa, lumbar pain, liver and spleen damage, as well as any of the other previously mentioned symptoms. Chronic contact with selenium compounds may cause garlic odor of breath and sweat, dermatitis, and moderate emotional instability., Dermatitis, garlic-like breath odor, pallor, nervousness, depression
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

CNS disorders
Dizziness
muscular weakness
Headache
cardiovascular disorders
Shortness of breath
donolence
Cough
Unconsciousness

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish

semi-static test LC50 - Oncorhynchus mykiss (rainbow trout) - > 100 mg/l - 96 h (OECD Test Guideline 203)
Remarks: (above the solubility limit in the test medium)

Toxicity to daphnia and other aquatic invertebrates

static test EC50 - Daphnia magna (Water flea) - > 100 mg/l - 48 h (OECD Test Guideline 202)
Remarks: (above the solubility limit in the test medium)

Toxicity to algae

static test ErC50 - Pseudokirchneriella subcapitata (algae) - > 100 mg/l - 72 h (OECD Test Guideline 201)
Remarks: (above the solubility limit in the test medium)

Toxicity to bacteria

static test EC50 - activated sludge - > 3.200 mg/l - 3 h (OECD Test Guideline 209)
12.2 Persistence and degradability
The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
Bioaccumulation Lepomis macrochirus - 60 d - 640 µg/l(Selenium)

Bioconcentration factor (BCF): 7,7

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

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

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3288    IMDG: 3288    IATA: 3288

14.2 UN proper shipping name
ADR/RID: TOXIC SOLID, INORGANIC, N.O.S. (Selenium)
IMDG: TOXIC SOLID, INORGANIC, N.O.S. (Selenium)
IATA: Toxic solid, inorganic, n.o.s. (Selenium)

14.3 Transport hazard class(es)
ADR/RID: 6.1    IMDG: 6.1    IATA: 6.1

14.4 Packaging group
ADR/RID: III    IMDG: III    IATA: III

14.5 Environmental hazards
ADR/RID: no    IMDG Marine pollutant: no    IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

**National legislation**


**Other regulations**

Observe work restrictions regarding maternity protection in accordance to Dir 92/85/EEC or stricter national regulations where applicable.

Take note of Dir 94/33/EC on the protection of young people at work.

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

**SECTION 16: Other information**

**Full text of H-Statements referred to under sections 2 and 3.**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H301</td>
<td>Toxic if swallowed.</td>
</tr>
<tr>
<td>H301 + H331</td>
<td>Toxic if swallowed or if inhaled.</td>
</tr>
<tr>
<td>H331</td>
<td>Toxic if inhaled.</td>
</tr>
<tr>
<td>H373</td>
<td>May cause damage to organs through prolonged or repeated exposure.</td>
</tr>
<tr>
<td>H413</td>
<td>May cause long lasting harmful effects to aquatic life.</td>
</tr>
</tbody>
</table>

**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.

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