



## Material Safety Data Sheet

---

### 1. Product & Company Identification

<b>Product:</b>	Non-Rechargeable Silver Oxide Battery (type 321)
<b>Nominal voltage:</b>	1.55 V
<b>Nominal capacity:</b>	14.5 mAh
<b>Manufacturer:</b>	Conrad Electronic SE
<b>Address:</b>	Klaus-Conrad-Str. 1, D-92240 Hirschau
<b>Telephone:</b>	+49 (0) 9604 / 40 - 8988
<b>Date of issue:</b>	30.11.2017

Electrochemical System: Zinc/NaOH Electrolyte/Silver Oxide

#### **Recommended use and restrictions on use**

Recommended use: battery, no restrictions, see section 7 handling and storage.

#### **Swallowed a Button Battery?**

Battery in the Nose or Ear? Please contact the local Tox Centers

(EU: [http://ec.europa.eu/growth/sectors/chemicals/poison-centres/index\\_en.htm](http://ec.europa.eu/growth/sectors/chemicals/poison-centres/index_en.htm)).

## Material Safety Data Sheet

---

### 2. Hazard Identification

#### 2.1 Classification of the substance or mixture

##### Classification according to UN-GHS

Batteries are considered as articles and are as such exempted from the UN-GHS classification requirements. The classification based on the hazardous substances contained in the product (electrode materials and liquid electrolyte contained in the batteries) is provided below for information purposes only.



Ox. Sol. 1	H271: May cause fire or explosion; strong oxidiser.
Eye Dam. 1	H318: Causes serious eye damage.
Skin Corr. 1A	H314: Causes severe skin burns and eye damage.
STOT RE 2	H373: May cause damage to organs (Brain) through prolonged or repeated exposure (Inhalation).
Aquatic Acute 1	H400: Very toxic to aquatic life.
Aquatic Chronic 1	H410: Very toxic to aquatic life with long lasting effects.

#### 2.2 GHS Label elements, including precautionary statements

The UN GHS labeling information is not provided in this section as batteries are articles and therefore are exempted from the UN GHS labeling requirements. Other labeling requirements apply for batteries according to EU Directive 2006/66/EC.

Nevertheless the following warning must be observed:

Keep out of reach of children.

#### 2.3 Other hazards which do not result in classification

The chemicals mentioned in Section 3 are contained in a stable container and are sealed.

Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see Safety precautions in Section VII). No adverse effects expected in case of swallowing an intact silver battery (small diameter and low voltage). Swallowing a damaged battery leads to chemical burns and perforation of soft tissues. Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.

## Material Safety Data Sheet

### 3. Composition / Information on Ingredients

#### 3.1 Substances

Not applicable

#### 3.2 Mixtures

IMPORTANT NOTE: The battery should not be opened or exposed to heat because exposure of the following ingredients contained within could be harmful under some circumstances.

Hazardous substances contained in the product according to UN-GHS:

Chemical Name	CAS No.	Content % of total weight	Hazard class and category	Hazard statement
<b>Cathode:</b>				
Disilver Oxide (Ag <sub>2</sub> O)	20667-12-3	14-43	Oxid. Solid 1 Eye Damage 1 Aquatic Acute 1 Aquatic Chronic 1	H271, H318, H400 (M=100)**, H410 (M=100)
Manganese Dioxide (MnO <sub>2</sub> )	1313-13-9	1-13	Acute Tox. 4, Acute Tox. 4, STOT RE 2	H302, H332, H373 (Brain) (Inhalation)
Graphite (C)	7782-42-5	0.3 - 2	-	not classified
<b>Anode:</b>				
Zink powder (Zn)	7440-66-6	4-14	Aquatic Acute 1 Aquatic Chronic 1	H400 (M=1)**, H410 (M=1)
<b>Electrolyte:</b>				
Sodium hydroxide (NaOH)	1310-73-2	1-6	Acute Tox. 4 Skin Corr. 1A	H314 (for conc. ≥5%)

\* Models: 301, 303, 309, 315, 317, 319, 321, 329, 335, 337, 339, 341, 344, 346, 362, 364, 365, 366, 371, 373, 377, 379, 381, 384, 390, 394, 395, 397

\*\*M: "M-factor" means a multiplying factor. It is applied to the concentration of a substance classified as hazardous to the aquatic environment acute category 1 or chronic category 1, and is used to derive by the summation method the classification of a mixture in which the substance is present;" (definition in regulation (EC) No 1272/2008)



## Material Safety Data Sheet

---

### 4. First Aid Measures

None unless internal material exposure.

If contact with internal components, observe following instructions

#### 4.1 Description of necessary first aid measures

##### Swallowing:

Contents of an opened battery can cause serious chemical burns of mouth, oesophagus, and gastrointestinal tract. Drink a plenty of water. Do not induce vomiting. Consult a physician immediately.

##### Inhalation:

Fumes of alkaline solution can cause respiratory irritation. Provide fresh air and consult a physician.

##### Skin contact:

Skin contact with contents of an opened battery causes severe skin burns. Remove contaminated clothing and wash skin with soap and water. Consult a physician immediately.

##### Eye contact:

Contents of an opened battery causes serious eye damage. Immediately flush eyes thoroughly with water for at least 15 minutes. Consult a physician immediately.

#### 4.2 Most important symptoms / effects, acute and delayed

The chemicals mentioned in Section 3 are contained in a stable container and are sealed. Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see Safety precautions in Section VII). Swallowing of a battery can lead to chemical burns and perforation of soft tissues. Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.

In case of exposure to inner component/material of the battery: Causes serious eye damage. (Disilver Oxide (Ag<sub>2</sub>O)). Causes severe skin burns and eye damage. (Disilver Oxide (Ag<sub>2</sub>O), Sodium hydroxide (NaOH)). May cause damage to organs (Brain) through prolonged or repeated exposure (Inhalation) (Manganese Dioxide).

#### 4.3 Indication of immediate medical attention and special treatment needed

No further information available.

### 5. Fire Fighting Measures

#### 5.1 Suitable extinguishing media

In case of fire, any class of extinguisher is effective.

#### 5.2 Specific hazards arising from the chemical

When exposed to heat, the battery may rupture, release hazardous substances and emit hazardous fumes of alkaline.

#### 5.3 Special protective actions for fire-fighters

Wear self-contained breathing apparatus and full gear to avoid inhalation and eyes or skin contact with harmful alkaline mist. In case of major fire and large quantities, evacuate area.



## Material Safety Data Sheet

---

### 6. Accidental Release Measures

#### 6.1 Personal precautions, protective equipment and emergency procedures

Steps to be taken in case material is released or spilled:

The preferred response is to leave the area and allow the batteries to cool and the vapours to dissipate. Avoid skin and eye contact or inhalation of vapours.

#### 6.2 Environmental precautions

Do not allow product to reach sewage system or any water course. In the event of spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

#### 6.3 Methods and material for containment and cleaning up

In the event of spill or accidental release, collect all released material in a plastic lined metal container and remove spilled liquid with absorbent. Doing this, protect your skin and eyes with chemical resistant protective gloves (EN374, material: rubber) and tightly sealed protective goggles (EN166). Avoid direct contact with internal components.

### 7. Handling and Storage

When used correctly, primary batteries provide a safe and dependable source of power. However, if they are misused or abused, leakage, venting, or in extreme cases explosion and/or fire may result.

#### 7.1 Precautions for safe handling

- Do not insert batteries in reverse. Observe the polarity markings on battery and equipment
- Do not short-circuit batteries
- Do not charge batteries
- Do not force discharge batteries
- Do not mix old and new batteries or batteries of different types or brands
- Exhausted batteries should be immediately removed from equipment and properly disposed of
- Do not heat batteries by exposure to high temperatures and direct sunlight.
- Do not weld or solder directly to batteries
- Do not dismantle batteries
- Do not deform batteries
- Do not dispose of batteries in fire
- Keep batteries out of the reach of children. In case of ingestion of a cell or battery, the person involved should seek medical assistance promptly.
- Do not allow children to replace batteries without adult supervision
- Do not encapsulate and/or modify batteries
- Remove batteries from equipment if it is not to be used for an extended period of time unless it is for emergency purposes.

## Material Safety Data Sheet

---

### 7.2 Conditions for safe storage, including any incompatibilities

The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking. The materials and packaging design shall be chosen so as to prevent the development of unintentional electrical contact, corrosion of the terminals and some protection from the environment.

- Store unused batteries in their original packaging away from metal objects. If already unpacked, do not mix or jumble batteries.
- Batteries shall be stored in well-ventilated, dry and cool conditions
- Battery cartons should not be piled up in several layers (or should not exceed a specified height)
- When batteries are stored in warehouses or displayed in retail stores, they should not be exposed to direct sun rays for a long time or placed in areas where they get wet by rain
- Do not mix unpacked batteries so as to avoid mechanical damage and/or short-circuit among each other
- For normal storage, the temperature should be between +10°C and +25°C, and should never exceed +30°C (according to IEC 60086-5). Extremes of humidity (over 95% R.H. and below 40% R.H) for sustained periods should be avoided since they are detrimental to both batteries and packaging. Batteries should therefore not be stored next to radiators or boilers nor in direct sunlight.

## 8. Exposure Controls / Personal Protection

### 8.1 Control parameters

Occupational exposure limits are observed as long as the battery remains intact.

### 8.2 Appropriate engineering controls

Ventilation is not necessary under conditions of normal use.

### 8.3 Individual protection measures, such as personal protective equipment (PPE)

In case of exposure to inner component/material (i.e. when handling damaged batteries), protect your skin and eyes with chemical resistant protective gloves (EN374, material: rubber) and tightly sealed protective goggles (EN166).

Respiratory protection (specify type): Not necessary under conditions of normal use.

Ventilation: Not necessary under conditions of normal use.

Protective gloves: Not necessary under conditions of normal use.

Eye protection: Not necessary under conditions of normal use.

Other protective clothing or equipment: Not necessary under conditions of normal use.

## Material Safety Data Sheet

---

### 9. Physical and Chemical Properties

#### 9.1 Basic physical and chemical properties

Physical state: Solid

Colour: according to product specifications

Odour: Not applicable

Melting point / Freezing point: Not applicable

Boiling point/Boiling range: Not applicable

Flammability: Not determined

Lower and upper explosion limits /

Flammability limit: Not determined

Flash point: Not applicable

Auto-ignition temperature: Not applicable

Decomposition temperature: No decomposition under normal conditions of use

pH: Not applicable

Kinematic viscosity: Not applicable

Solubility: Not applicable

Partition coefficient (n-octanol/water) log value: Not applicable

Vapour pressure: Not applicable

Density or relative density: Not applicable

Relative vapour density: Not applicable

Particle characteristics: Not applicable

### 10. Stability and Reactivity

The batteries are contained in a stable container and are sealed to avoid any chemical release under conditions of normal use.

#### 10.1 Reactivity

No reactions if article is used according to specifications.

#### 10.2 Chemical stability

No decomposition if article is used according to specifications.

#### 10.3 Possibility of hazardous reactions

No dangerous reactions if article is used according to specifications.

#### 10.4 Conditions to avoid

See section 7

#### 10.5 Incompatible materials

See section 7

#### 10.6 Hazardous decomposition products

No further information available

# Material Safety Data Sheet

---

## 11. Toxicological Information

### 11.1 Information on toxicological effects

The chemicals mentioned in Section 3 are contained in a stable container and are sealed. Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see handling and storage in section 7).

Classification based on the hazardous substances contained in the product (electrode materials and electrolyte solution contained in the batteries):

#### Acute toxicity

Based on classification of ingredients, the classification criteria are not met.

#### Skin corrosion/irritation

Causes severe skin burns (Disilver Oxide (Ag<sub>2</sub>O), Sodium hydroxide (NaOH))

#### Serious eye damage/irritation

Causes serious eye damage. (Disilver Oxide (Ag<sub>2</sub>O))

#### Respiratory or skin sensitization

Based on classification of ingredients, the classification criteria are not met.

#### Germ cell mutagenicity

Based on classification of ingredients, the classification criteria are not met.

#### Carcinogenicity

Based on classification of ingredients, the classification criteria are not met.

#### Reproductive toxicity

Based on classification of ingredients, the classification criteria are not met.

#### STOT-single exposure

Based on classification of ingredients, the classification criteria are not met.

#### STOT-repeated exposure

May cause damage to organs (Brain) through prolonged or repeated exposure (Inhalation) (Manganese Dioxide)

#### Aspiration hazard

Based on classification of ingredients, the classification criteria are not met.

### 11.2 Information on the likely routes of exposure

The chemicals mentioned in Section 3 are contained in a stable container and are sealed. Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (exposure via ingestion, skin or eye contact or inhalation). The most likely risk is acute exposure when a cell vents.

### 11.3 Symptoms related to the physical, chemical and toxicological characteristics

No further information available.

### 11.4 Delayed and immediate effects and also chronic effects from short and long term exposure

The chemicals mentioned in Section 3 are contained in a stable container and are sealed. Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see handling and storage in Section 7). No adverse effects expected in case of swallowing an intact silver battery (small diameter and low voltage). Swallowing a damaged battery leads to chemical burns and perforation of soft tissues. Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.





## Material Safety Data Sheet

---

### 11.5 Numerical measures of toxicity

No further information available.

### 11.6 Interactive effects

No further information available.

## 12. Ecological Information

The chemicals mentioned in Section 3 are contained in a stable container and are sealed. Under conditions of normal use, the chemicals will not be released.

### 12.1 Toxicity

Classification based on the hazardous substances contained in the product (electrode materials and electrolyte solution contained in the batteries):

Aquatic toxicity: Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.

### 12.2 Persistence and degradability

Not biodegradable.

### 12.3 Bioaccumulative potential

No further information available.

### 12.4 Mobility in soil

No further information available.

### 12.5 Other adverse effects

No further information available.

## 13. Disposal Considerations

### 13.1 Disposal methods

a) Be sure to comply with your federal, state and local regulation disposal of used batteries. Please dispose of used batteries or batteries you don't need any more at an official collection point (if official collection point existing).

Dispose in accordance with appropriate national and international regulations, below some references.

**European Community:** according to Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), Annex VII, batteries have to be removed from any separately collected WEEE. The removed batteries have to be treated according to the Battery directive 2006/66/EC

**US:** Batteries are neither specifically listed nor exempted from the Federal Environmental Protection Agency (US EPA) hazardous waste regulations.

As electric capacity can be left in a discarded battery and it comes into contact with other metals, it could lead to distortion, leakage, overheating, or rupture, so make sure to cover the (+) or (-) terminals with electrical or adhesive tape or some other insulator before disposal.

**Use a professional disposal firm for disposal of mass quantities of undischarged batteries.**

b) Open cells should be treated as hazardous waste



## Material Safety Data Sheet

---

### 14. Transportation Information

In general, all batteries in all forms of transportation (ground, air, or ocean) must be packaged in a safe and responsible manner. Regulatory concerns from all agencies for safe packaging require that batteries be packaged in a manner that prevents short circuits and be contained in "strong outer packaging" that prevents spillage of contents.

All original packaging for our silver oxide batteries has been designed to be compliant with these regulatory concerns.

Silver oxide batteries (sometimes referred to as "Dry cell" batteries) are not listed as dangerous goods under the IATA Dangerous Goods Regulations, ICAO Technical Instructions and the U.S. hazardous materials regulations (49 CFR).

These batteries are not subject to the dangerous goods regulations provided they meet the requirements contained in the following special provisions.

Regulatory Body	Packing Instruction and Special Provisions
ICAO TI 2017-2018) or IATA Dangerous Goods Regulations 2017 (58th Edition)	Special Provision A123
International Maritime Dangerous Goods (IMDG) IMDG Code 2015	Special Provision A304

All our silver oxide batteries are packed in such a way to prevent short circuits or the generation dangerous quantities of heat and meet the special provisions listed above. In addition, the IATA Dangerous Goods Regulations and ICAO Technical Instructions require the words "not restricted" and the Special Provision number A123 be provided on the air waybill, when an air waybill is issued.

### 15. Regulatory Information

Environment-related law of batteries: EU nations have applicable law in accordance with Directive 2006/66/EC and other some countries, China, Korea, Brazil, some provinces of USA and Canada or so have similar law.



## Material Safety Data Sheet

---

### 16. Other Information

If you need further information, please contact us.

#### Abbreviations

Acute Tox. 4: Acute toxicity, Hazard Category 4

Aquatic Acute 1: Hazardous to the aquatic environment, Acute Hazard Category 1

Aquatic Chronic 1: Hazardous to the aquatic environment, Chronic Hazard Category 1

Eye Dam. 1: Serious eye damage/eye irritation, Hazard Category 1

Ox. Sol. 1: Oxidising Solids, Hazard Category 1

Ox. Liq. 1: Oxidising Liquids, Hazard Category 1

Skin Corr. 1A: Skin corrosion/irritation, Hazard Category 1A

Skin Corr. 1B: Skin corrosion/irritation, Hazard Category 1B

STOT RE 2 Specific target organ toxicity — Repeated exposure, Hazard Category 2

H271: May cause fire or explosion; strong oxidiser.

H302: Harmful if swallowed

H314: Causes severe skin burns and eye damage

H318: Causes serious eye damage

H332: Harmful if inhaled

H373 May cause damage to organs (...) through prolonged or repeated exposure (...)

H400: Very toxic to aquatic life.

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

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

CAS: Chemical Abstracts Service (division of the American Chemical Society)

GHS: Globally Harmonised System of Classification and Labelling of Chemicals

IATA: International Air Transport Association

IMDG: International Maritime Code for Dangerous Goods

#### Disclaimer:

The batteries are exempt articles and are not subject to hazard Communication Standard Requirement. This sheet is provided as technical information only. The information contained in this Product Safety Data Sheet has been established to the best of our knowledge and belief. We make no representation and provides no warranty or guarantee regarding the contents of this Product Safety Data Sheet and excludes its liability, express or implied.