# Material - Safety - Data Sheet (MSDS)

for

**Ansmann Lithium-Manganese-Dioxide (Li-metal) Batteries**

single cells and multi-cell batteries

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## Section 1 — Product and Supplier Identification

Product name: **Primary (non-rechargeable) Lithium Battery**; nominal voltage: 3.0V

Models / types: Photo Batteries: CR123, CR2, 2CR5, CR-P2,

Button Cells: CR1025,CR1216, CR1220, CR1225, CR1616, CR1620, CR1632, CR2016, CR2025, CR2032, CR2330, CR2354, CR2430, CR2450, CR2477, CR3032

E-Block, 9V, (CR-V9, ER9V)

Electrochemical system: **Lithium Manganese Dioxide** ($Li + MnO_2 \rightarrow LiMnO_2$)
Primary, **not** designated for Recharge

Supplier:
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**EMERGENCY CONTACT:** For chemical emergency (spill, leak, fire, exposure or accident) call phone no.: +49 6294 4204 0

**Legal remark (USA)**

Safety Data Sheets are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article". According to OSHA, "article" means a manufactured item other than a fluid particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon ist shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g. minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

Because all of our batteries are defined as "articles", they are exempted from the requirements of the Hazard Communication Standard.

**Legal remark (EU)**
These batteries are no "substances" or "mixtures" according to Regulation (EC) No 1907/2006EC. Instead they have to be regarded as "articles", no substances are intended to be released during handling. Therefore there is no obligation to supply a "safety data sheet according to Regulation (EC)1907/2006, Article 31"

**General remark**
This safety data sheet is provided as a service to our customers. The details presented are in accordance with our present knowledge and experiences. They are no contractual assurances of product attributes.

## Section 2 Hazards Identification

### 2.1 Classification of the substance or mixture

**Classification according to UN-GHS**
Batteries are considered as articles 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 in section 3 and 16; this is for information purposes only.

### 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 the reach of children!

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

The chemicals mentioned in section 3 are contained in a sealed can. Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested ( see Safety Precautions in section 7). Swallowing of a battery can lead to chemical burns, perforation of soft tissues and death.
Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.

## Section 3 Composition and Informations 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:

| Ingredients | Content | CAS No. | Hazard Categories | Hazard Statements |
|---|---|---|---|---|
| Manganese Dioxide ($MnO_2$) | 15 - 50% | 1313-13-9 | Acute Tox. 4<br>STOT RE2 | H302, H332,<br>H373 |
| Lithium (Li) | 1.1 - 3.3% | 7439-93-2 | Water-react. 1<br>Skin Corr. 1B | H260, H314 |
| Propylene Carbonate (PC) | 2 - 9% | 108-32-7 | Skin Irrit. 2 | H319 |
| 1,2 Dimethoxy Ethane (DME) | 1 - 3.5% | 110-71-4 | Flam Liq.2, Acute Tox.4<br>Repr. 1B | H225, H332,<br>H360FD |
| Lithium Trifluoromethyl Sulfonate ($CF_3SO_3Li$)<br>(only Photo Batteries) | < 5% | 33454-82-9 | Skin Irrit. 2<br>Eye Irrit. 2<br>STOT SE3 | H315, H319,<br>H335 |
| Lithium Perchlorate ($LiClO_4$)<br>(only Button Cells) | < 1% | 7791-03-9 | Ox. Sol. 2, Skin Irrit. 2<br>Eye Irrit. 2A<br>STOT SE3 | H272, H315,<br>H319, H335 |
| Graphite, synthetic (C)<br>(only Button Cells) | 3 - 10% | 7440-44-0 | Eye Irrit. 2A<br>STOT SE3 | |
| Stainless steel (Fe) | 30 - 80% | 65997-19-5 | | |
| Plastics, paper, water | 10 - 20% | | | |

Full text of Hazard Statements and GHS pictograms: see chapter 16
Approximate weight of metallic lithium per cell/battery: see chapter 16

## Section 4 First Aid Measures

**None**, unless internal material exposure

### 4.1 Description of necessary first aid measures

**Skin Contact:** Wash off skin thoroughly with water. Remove contaminated clothing and wash before re-use. If irritation persists, get medical help.

**Eye Contact:** Irrigate thoroughly with water for at least 15 minutes.Lifting upper and lower lids, until no evidence of the chemical remains. Obtain medical attention immediately.

**Ingestion:** Seek medical attention immediately.

**Inhalation:** If battery is leaking, contents may be irritating to respiratory passages. Move to fresh air. If irritation persists, seek medical advice.

**Further treatment:** All cases of eye contamination, persistent skin irritation and casualities who have swallowed this substance or been affected by breathing its vapours should be seen by a doctor.

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

The chemicals mentioned in section 3 are contained in a sealed can. Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see safety precautions in section 7). Swallowing of a battery can lead to chemical burns, perforation of soft tissues and death. Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.
See emergency phone number in section 1.

In case of exposure to inner components/material of the battery:
Harmful if swallowed (Manganesedioxide)
Harmful if inhalated (Manganesedioxide, DME; $LiClO_4$)
May cause damage to organs (brain) through prolonged or repeated exposure (inhalation) (Manganesedioxide)

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

No further information available.

## Section 5 Fire Fighting Measures

### 5.1 Suitable extinguishing media

In case of fire in an adjacent area, use water. CO2 or dry chemical extinguishers if cells are packed in their original containers since the fuel of the fire is basically paper products. For bulk quantities of unpackaged cells use for example LITH-X (Graphite Base). In this case, do not use water.
In a small room, remember that the supply of oxygen is quickly consumed in feeding a lithium fire.

### 5.2 Specific hazards arising from the chemical

When exposed to heat, the battery may rapture and release hazardous substances. Burning lithium manganese dioxide batteries produce toxic and corrosive lithium hydroxide fumes. Lithium metal reacts with water and forms flammable hydrogen gas.

### 5.3 Special protective actions for firefighters

Firefighters should wear positive pressure self-contained breathing apparatus to avoid inhalation of hazardous decomposition products. Fight fire from a distance or protected area while using full protective clothing.

## Section 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 batteries to cool and the vapours to disssipate.
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 (EN374) and tightly sealed protective googles (EN166). Avoid direct contact with internal components.

## Section 7 Precautions for safe Handling and Storage

When used correctly, alkaline batteries provide a safe and dependable source of power. However, if they are misused or abused, leakage, heating or in extreme case, explosion may result. Therefore pay attention to the following recommendations:

**7.1 Storage:** Store batteries in a dry place at normal room temperature (+10°C…+25°C), never exceeding +30°C, away from moisture, sources of heat, open flames, food and drink. Elevated temperatures can result in shortened battery life. Temperautes above 100°C may result in battery leakage and rupture.
Storage at low temperature will make them last longer; however do not refrigerate!
Storage of unpacked batteries can cause electrical short circuit and heat generation. Avoid large temperature changes and direct sunlight.

**7.2 Storage of big quantities:** If possible, store the batteries in the original packaging, isolated from unnecessary combustibles. A fire alarm is recommended.
Do not stack battery cartons on top of each other exceeding a specified height.
For automatic fire extinguisher consider section 5 "Fire Fighting Measures"

**7.3 Handling:** Avoid mechanical or electrical abuse. Do not short circuit or install incorrectly.
Install batteries in accordance with equipment instructions.
In case of battery change always replace all batteries by new ones of identical type and brand.
Do not carry batteries loose in a pocket or bag.
Keep batteries away from children. For devices to be used by children, the battery casing should be protected against unauthorized access.
Do not swallow batteries.
Do not throw batteries into fire or water.

**7.4 Charging:** **Do not charge this batteries!** This battery type is manufactured in a ready-to-use-state. It is not designed for recharging.

**7.5 Disposal:** Dispose in accordance with all applicable federal, state and local regulations.
Do not incinerate or subject battery cells to temperatures in excess of 100°C (212°F). Such treatment can cause cell rupture.

## Section 8 Exposure Controls / Special Protection Information

**8.1 Control Parameters**
Occupational exposure limits are observed as long as the battery remains intact.

**8.2 Appropriate engineering conrols**
Ventilation is not necessary under conditions of normal use. Avoid contact with water.

**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) and tightly sealed protective goggles (EN166).

**Ventilation Requirements:** Not necessary under conditions of normal use. Room ventilation may be required in areas where there are open or leaking batteries.

**Respiratory Protection:** Not necessary under conditions of normal use. Avoid exposure to electrolyte fumes from open or leaking battery. In all fire situations, use self-contained breathing apparatus

**Eye Protection:** Not necessary under conditions of normal use. Wear tightly sealed protective goggles if handling an open or leaking battery.

**Hand Protection:** Not necessary under conditions of normal use. Use neoprene or natural rubber gloves if handling an open or leaking battery

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

## Section 9 Physical and Chemical Properties

9.1 Basic physical and chemical properties

| | | | |
|---|---|---|---|
| Physical state: | solid | Vapour Pressure: | n/a* |
| Melting/Freezing Point: | n/a* | VOC Content: | n/a* |
| Boiling Point/Range: | n/a* | Solubility: | n/a* |
| Evaporation Rate: | not determined | pH: | n/a* |
| (Relative) Density: | n/a* | Auto-Ignition Temperaure: | n/a* |
| Relative Vapour Density: | n/a* | Kinematic Viscosity: | n/a* |
| Flammability (Limit): | not determined | Colour: | according to product specific. |
| Odour: | n/a* | | |
| Flash Point: | flash point of electrolyte solvents: DME: -6°C, PC: 123°C, Mixture: 20°C | | |
| Decomposition Temperature: | no decomposition under normal conditions of use | | |

n/a*: not applicable for closed batteries

## Section 10 Stability and Reactivity

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

**10.1 Reacitvity**
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 usedaccording 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

## Section 11 Toxicological Information

**11.1 Information on toxicological effects**
The chemicals mentioned in section 3 are contained in a sealed can.
Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see safety precautions in section 7)

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

**Acute toxicity**
Harmful if swallowed (Manganese Dioxide)
Harmful if inhaled (Manganese Dioxide, DME)

**Skin corrosion/irritation**
Causes skin irritation (Lithium)

**Serious eye damage/irritation**
Causes serious eye damage (Lithium)

**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 toxicty**
May damage fertility. May damage the unborn child (DME)

**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 entry**
The chemicals mentioned in section 3 are contained in a sealed can.
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 sealed can.
Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see safety precautions in section 7). Swallowing of a battery can lead to chemical burns, perforation of soft tissues and death. Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.

**11.5 Numerical measures of toxicity**
No further information available.

**11.6 Interactive effects**
No further information available.

## Section 12 Ecological Information

The chemicals mentioned in section 3 are contained in a sealed battery can.
Under conditions of normal use, the chemicals will not be released.

ANSMANN Lithium manganese cells described in this MSDS do not contain heavy metals as defined by the European Directive 2006/66/EC Article 21; they comply with the chemical composition requirements of this directive.

Mercury has not been "intentionally introduced (as distinguished from mercury that may be incidentally present in other materials)" in the sense of the USA "Mercury-Containing and Rechargeable Battery Management Act" (May 13 1996).

The Regulation on Mercury Content Limitation for Batteries promulgated on 1997-12-31 by the China authorities including the State Administration of Light Industry and the State Environmental Protection Administration defines 'low mercury' as 'mercury content by weight in battery as less than 0.025%' , and 'mercury free' as 'mercury content by weight in battery as less than 0.0001%'. And therefore: ANSMANN Lithium manganese cells/batteries belong to the category of mercury-free battery (mercury content lower than 0.00001%)

**12.1 Toxicity**
Aquatic toxicity: Based on classification of ingredients, the classification criteria are not met.

**12.2 Persistence and degradability**
Not biodegradable.

**12.3 Bioaccumulative potential**
No further information available.

**12.4 Mobility in soil and other adverse effects**
No further information available.

## Section 13 Disposal Considerations

**13.1 Disposal methods**

a) **Be sure to comply with your federal, state and local regulation disposal of used batteries**

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

EU: 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 Battery directive 2006/66/EC
European Waste Catalogue: 16 06 05 other batteries and accumulators

US: Lithium batteries are neither specifically listed nor exempted from the Federal Environmental Protection Agency ((US EPA) hazardous waste regulations. The only material of possible concern due to ist reactivity is lithium metal. However, button cells contain so little lithium that they can be disposed of in the normal municipal waste stream.
**Use a professional disposal firm for disposal of mass quantities of undischarged lithium batteries.**

b) Open cells should be treated as hazardous waste.

Customers find detailed information on disposal in their specific countries using the web site of the European Portable Batteries Association ***(http://www.epbaeurope.net/legislation_national.html)***

## Section 14 Transport Information

**General considerations**

Ansmann primary Lithium button cell are considered to be UN 3090 Lithium Metal Batteries and are tested according to subsection 38.3 of the “UN Manual of Tests and Criteria” for compliance with the requirements of special provisions ADR 188, IMDG 188, as well as the requirements of DOT / 49 CFR § 173.185, and the requirements of IATA DGR packing instruction 968. Test results as well as other relevant information required for transportation are given in dedicated “Supplier’s Test Summaries”.

Transportations of cells or batteries packed with equipment or contained in equipment have to follow the appropriate regulations for UN 3091.

During the transportation of large amounts of batteries by ship, trailer or railway, do not store them in places of high temperature and do not allow them to be exposed to condensation. During the transportation do not allow the packaging to be damaged, as a damage of the packaging may cause fire.
In the event packaging is damaged, special procedures must be used including inspection and repackaging if necessary and handle with care.

Compilations of transport requirements for Lithium batteries can be found in:
https://www.lithium-batterie-service.de/en/
https://www.iata.org/whatwedo/cargo/dgr/Documents/lithium-battery-shipping-guidelines.pdf

Each cell or battery is manufactured under a quality management program according to IATA DGR clause 3.9.2.6, ADR clause 2.2.9.1.7 e), and IMDG code clause 2.9.4.5.

**IEC 60086-1**

Code of practice for packaging and shipment of primary batteries given in IEC 60086-1:

“The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking. The materials and pack design shall be chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of moisture.”

“Shock and vibration shall be kept to a minimum. For instance, boxes should not be thrown off trucks, slammed into position or piled so high as to overload battery containers below.
Protection from inclement weather should be provided.”

## Section 15 Regulatory Information

**Marking consideration**

European Union: According to “DIRECTIVE 2006/66/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 6
September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC” the batteries have to be marked with the crossed bin.

For the state of California these batteries have to be marked as “containing perchlorate”.

**REACH regulation (1907/2006/EC)**
**Duty to communicate information on substances in articles (REACH, Article 33):**
The product contains the following substance of very high concern (SVHC) in concentrations above 0.1% w/w: DME (CAS 110-71-4): reason for inclusion in the European candidate list - Toxic for reproduction (REACH, Article 57c).

**International safety standards**

For UL recognition of the basis cells according to UL 1642 see: BBCV2.MH13654

**Water hazard class**

The regulations of the German Federal Water Management Act (WHG) are not applicable as Ansmann primary Lithium button cell are articles and not substances, thus there is no risk of water pollution, except the batteries are violated or dismantled.

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

## Section 16 Other Information

**Aproxximate weight of metallic lithium per cell / battery:**

| | | | | |
|---|---|---|---|---|
| CR1025: 0.008 g | CR1620: 0.02 g | CR2032: 0.07 g | CR2450: 0.18g | CR123: 0.6 g |
| CR1216: 0.008 g | CR1632: 0.04 g | CR2330: 0.08 g | CR2477: 0.29g | CR2: 0.33 g |
| CR1220: 0.01 g | CR2016: 0.03 g | CR2354: 0.17 g | CR3032: 0.15g | |
| CR1616: 0.02 g | CR2025: 0.05 g | CR2430: 0.09 g | CR1/3N: 0.06g | **per battery:** |
| | | | | CR-V9: 1.36 g |
| | | | | 2CR5: 1.2g |
| | | | | CR-2P: 1.2g |

**Full text of Hazard Statements referred to under section 3**

| | |
|---|---|
| H225 | Highly flammable liquid and vapour |
| H260 | In contact with water releases flammable gases which may ignite spontaneously. |
| H272 | May intensify fire; oxidiser |
| H302 | Harmful if swallowed |
| H314 | Causes severe skin burns and eye damage |
| H315 | Causes skin irritation |
| H332 | Harmful if inhaled |
| H335 | May cause respiratory irritation |
| H360FD | May damage fertility. May damage the unborn child. |
| H373 | May cause damage to organs (brain) through prolonged or repeated exposure |

**Abbreviations**

| | |
|---|---|
| Acute Tox.4 | Acute toxicity, Hazard category 4 |
| Eye Dam. 1 | Serious eye damage / irritation, Hazard category 1 |
| Eye Irrit. 2 | Serious eye damage / irritation, Hazard category 2 |
| Flam Liq. 2 | Flammable liquids, Hazard category 2 |
| Ox. Sol. 2 | Oxidising solids, Hazard category 2 |
| Repr. 1B | Reproductive toxicity, Hazard category 1B |
| Skin Irrit. 2 | Skin corrosion / irritation, Hazard category 2 |
| STOT RE2 | Specific target organ toxicity - repeated exposure, Hazard category 2 |
| STOT SE3 | Specific target organ toxicity - single exposure, Hazard category 3 |
| Water-react. 1 | Water reactive, Hazard category 1 |
| ADR | European Agreement concerning the International Carriage of Dangerous Goods by Road |
| CAS | Chemical Abstracts Service (division of the American Chemical Society) |
| GHS | Globally Harmonized System of Classification and Labelling of Chemicals |
| IATA | International Air Transport Association |
| IMDG | International Maritime Code of Dangerous Goods |
| SVHC | substance of very high concern |

**Note:** Date of issue of the transport regulations: ADR 2023; RID 2023; IATA (2024, 65$^{th}$ edition); IMDG 2024 / 41-22; DOT / 49 CFR 2023
Latest covered modification of the European Battery Directice 2006/66/EC: Directive 2013/56/EU

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