1. **Identification of the product and of the company undertaking**

**Product details**

- **Trade name:** Hydrogen Gas Generating Cells – Series V … H2 MF
- **Product types:**
  - 24690 (V 150 H2 MF)
  - 24691 (V 140 H2 MF S)
  - 24696 (V 40 H2 MF)
- **Electrochemical system:** Zinc | KOH electrolyte | proprietary catalyst
- **Anode (negative electrode):** Zinc
- **Cathode (positive electrode):** Catalyst

**Supplier details**

- **Address:** VARTA Microbattery GmbH
  Daimlerstr. 1
  D-73479 Ellwangen/Jagst
  Germany
- **Emergency telephone number:** +49 7961 921 110 (VAC)

**Legal remark**

These batteries are no “substances” or “mixtures” according to Regulation (EC) No 1907/2006 EC. 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.

2. **Hazards identification**

A sealed hydrogen gas generating cell is not hazardous in normal use (as defined in chapter 7).

In case of mistreatment (charge, reverse charge) and in case of fault, some electrolyte can leak from the cell. In these cases refer to the risk of potassium hydroxide solution (corrosive, pH > 14). Charging may cause rupture. The electrode materials are only hazardous, if the materials are released by mechanical damaging of the cell or if exposed to fire.
3. Composition/information on ingredients

Ingredients

<table>
<thead>
<tr>
<th>Contents</th>
<th>CAS No.</th>
<th>Hazard Categories</th>
<th>Hazard Statements</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 - 44 %</td>
<td>7440-66-6</td>
<td>Aquatic Chronic 1</td>
<td>H410</td>
<td>Zinc</td>
</tr>
<tr>
<td>0,01 - 0,03 %</td>
<td>7439-92-1</td>
<td>Repr. 1A</td>
<td>H360D</td>
<td>Lead</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute Tox. 4</td>
<td>H332</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>H302</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STOT RE 2</td>
<td>H373</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aquatic Chronic 1</td>
<td>H410</td>
<td></td>
</tr>
<tr>
<td>0 - 14 %</td>
<td>1313-13-9</td>
<td>Acute Tox. 4</td>
<td>H302</td>
<td>Manganese oxide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>H332</td>
<td></td>
</tr>
<tr>
<td>2 - 6 %</td>
<td>1310-58-3</td>
<td>Acute Tox. 4</td>
<td>H302</td>
<td>Potassium hydroxide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin Corr. 1A</td>
<td>H314</td>
<td></td>
</tr>
</tbody>
</table>

Full text of Hazard statements: see section 16.

Heavy Metals and RoHS Relevant Substances

<table>
<thead>
<tr>
<th>Contents</th>
<th>CAS No.</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 mg/kg</td>
<td>7440-43-9</td>
<td>Cadmium</td>
</tr>
<tr>
<td>&lt; 5 mg/kg</td>
<td>7439-97-6</td>
<td>Mercury (none intentionally introduced, see Chapter 12)</td>
</tr>
<tr>
<td>&lt; 5 mg/kg</td>
<td></td>
<td>Hexavalent Chromium (Cr(^{6+}))</td>
</tr>
<tr>
<td>&lt; 5 mg/kg</td>
<td></td>
<td>PBB</td>
</tr>
<tr>
<td>&lt; 5 mg/kg</td>
<td></td>
<td>PBDE</td>
</tr>
</tbody>
</table>

Other Ingredients

<table>
<thead>
<tr>
<th>Contents</th>
<th>CAS No.</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 - 70 %</td>
<td></td>
<td>Nickel plated steel</td>
</tr>
<tr>
<td>2 - 5 %</td>
<td></td>
<td>Copper</td>
</tr>
<tr>
<td>2 - 7 %</td>
<td></td>
<td>Polymers</td>
</tr>
</tbody>
</table>

4. First-aid measures

Measures at accidental release

After inhalation: Fresh air. Seek for medical assistance.

After skin contact: Flush affected areas with plenty of water. Remove contaminated cloth immediately. Seek for medical assistance.

After eye contact: Flush the eye gently with plenty of water (at least 15 minutes). Seek for medical assistance.

After ingestion: Drink plenty of water. Avoid vomiting. Seek for medical assistance. No trials for neutralization.

5. Fire-fighting measures

Suitable extinguishing media: Use foam, water, or CO\(_2\), as appropriate.

Extinguishing media with limited suitability: (none)

Special protection equipment during fire-fighting: Contamination cloth including breathing apparatus.

Special hazard: (none)
6. **Accidental release measures**

Person related measures: Wear personal protective equipment adapted to the situation (protection gloves, cloth).

Environment protection measures: In the event of cell rupture, prevent skin contact and collect all released material in a plastic lined container.

Dispose of according to the local law and rules.

Avoid leached substances to get into the earth, canalization or waters.

Treatment for cleaning: If hydrogen gas generating cells casing is dismantled, small amounts of electrolyte may leak. Pack the hydrogen gas generating cells including ingredients as described above. Then clean with water (diluted acetic acid may be helpful).

7. **Handling and storage**

Guideline for safe handling: Always follow the warning information on the H₂ cells and in the manuals of devices. Only use the recommended H₂ cell types.

Keep H₂ cells away from children.

For devices to be used by children, the H₂ cell casing should be protected against unauthorized access or have to be supervised by qualified adult.

Unpacked H₂ cells shall not lie about in bulk.

In case of H₂ cell change always replace all H₂ cells by new ones of identical type and brand.

Do not swallow H₂ cells.

Do not discharge H₂ cells longer than 1 day under water.

Do not throw H₂ cells into fire.

Do not recharge H₂ cells.

Do not open or disassemble H₂ cells.

Storage: Storage preferably at room temperature (approx. 20°C). Avoid large temperature changes. Avoid direct sunlight. At higher temperatures the gas generation performance is speeded up. Avoid temperatures outside specified range from data sheet.

Storage of unpacked batteries can cause short circuit and uncontrolled gas generation.

Storage of large amounts: If possible, store the H₂ cells in original packaging (short circuit protection); A hydrogen gas alarm and fire alarm is recommended;

For automatic fire extinction consider chapter 5 “Fire fighting measures”.

Storage category according to TRGS 510: It is recommended to consider the “Technical Rule for Hazardous Substances TRGS 510 - Storage of hazardous substances in nonstationary containers” and to handle hydrogen gas generating cells according to storage category 11 (“combustible solids”).

Use: The normal use (discharge) implies the electrochemical generation and release of hydrogen gas from the cell/battery assembly. As this gas is extremely flammable, the application must exclude any risk of fire or explosion.

8. **Exposure controls/personal protection**

Under normal conditions (discharge, avoid prolonged deep discharge) release of ingredients does not occur. Discharge implies release of hydrogen gas from the cell/battery assembly (see Chapter 7).

9. **Physical and chemical properties**

Not applicable if closed.

10. **Stability and reactivity**

Dangerous reactions: When heated above 60°C the risk of rupture occurs.
11. Toxicological information

Under normal conditions (during discharge) release of ingredients does not occur. If accidental release occurs see information in section 2, 3, and 4.

Swallowing of a H₂ cell can be harmful. Call the local Poison Control Centre for advice and follow-up.

12. Ecological information

Hydrogen gas generating cells do contain lead, and do not contain mercury and cadmium as defined by the European directive 2006/66/EC Article 21.

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

The Regulation of 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: VARTA gas generating button cells – series V ... MF belong to the category of low-mercury battery (mercury content lower than 0.025%).

13. Disposal considerations

USA: Hydrogen gas generating cells/battery assemblies are classified by the federal government as non-hazardous waste and are safe for disposal in the normal municipal waste stream. End-users may, however, go to the website of Call2Recycle, Inc. at www.call2recycle.org to obtain additional information for local options of collection and recycling.


Importers and users outside EU should consider the local law and rules.

In order to avoid short circuit and heating, used hydrogen gas generating cells should never be stored or transported in bulk. Proper measures against short circuit are:

- Storage of H₂ cells / batteries in original packaging
- Coverage of the terminals

14. Transport information

VARTA hydrogen gas generating cells (H₂ cells) are considered to be "dry cell" batteries and are unregulated for purposes of transportation by the U.S. Department of Transportation (DOT), International Civil Aviation Administration (ICAO), International Air Transport Association (IATA), the International Maritime Organization (IMO), the "Accord Européen Relatif au Transport International des Marchandises Dangereuses par Rout" (ADR) ) and the "Règlement concernant le transport international ferroviaire de marchandises Dangereuses" (RID).

IATA DGR: Special Provision A123: "Examples of such batteries are: alkaline-manganese, zinc-carbon, nickel-metal hydride and nickel-cadmium batteries. Any electrical battery ... having the potential of a dangerous evolution of heat must be prepared for transport as to prevent (a) a short-circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals...) is forbidden from transport; and (b) accidental activation. The words "Not Restricted" and the Special Provision number must be included in the description of the substance on the Air Waybill as required by 8.2.6, when an Air Waybill is issued."

ADR/RID/IMDG Code: As hydrogen gas generating cells are not explicitly mentioned in these Dangerous Goods regulations, there are no special Dangerous Goods shipment requirements for these products.

USA: 49 CFR § 172.102 Special Provision 130: "Dry batteries not specifically covered by another entry in the §172.101 Table are covered by this entry (i.e., Batteries, dry, sealed, n.o.s.) and are not subject to requirements of this subchapter except for the following: [...] (b) Preparation for transport. Batteries and battery-powered device(s) containing batteries must be prepared and packaged for transport in a manner to prevent: (1) A dangerous evolution of heat; (2) Short circuits, including but not limited to the following methods: [...] (ii) Separating or packaging batteries in a manner to prevent contact with other batteries, devices or conductive materials (e.g., metal) in the packagings [...]; and (3) Damage to terminals. If not impact resistant, the outer packaging should not be used as the sole means..."
of protecting the battery terminals from damage or short circuiting. Batteries must be securely cushioned and packed
to prevent shifting which could loosen terminal caps or reorient the terminals to produce short circuits."

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.”

15. Regulatory information

Marking consideration: 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 all
batteries have to be marked with the crossed bin; according to Article 21 of this
directive primary H2 cells have to be marked with the element symbol “Pb”. Due
to the size of the battery, this marking has to be placed on the packaging.

International safety standards: IEC 60086-5.

Water hazard class: The regulations of the German Federal Water Management Act (WHG) are not
applicable as hydrogen gas generating cells are articles and not substances,
thus there is no risk of water pollution, except the batteries are violated or
dismantled.

16. Other information

Full text of Hazard Statements referred to under section 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H302</td>
<td>Harmful if swallowed</td>
</tr>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage</td>
</tr>
<tr>
<td>H332</td>
<td>Harmful if inhaled</td>
</tr>
<tr>
<td>H360D</td>
<td>May damage fertility or the unborn child</td>
</tr>
<tr>
<td>H373</td>
<td>May cause damage to organs through prolonged or repeated exposure</td>
</tr>
<tr>
<td>H410</td>
<td>Very toxic to aquatic life with long lasting effects</td>
</tr>
</tbody>
</table>

Note: Date of issue of the transport regulations: ADR 2017, RID 2017, IATA 2018
Latest covered modification of the European Battery Directive 2006/66/EC:
Directive 2013/56/EU.

Issued by: VARTA Microbattery GmbH
Quality / Environmental Management

RoHS: See special Declaration

REACH: See special Declaration

Issued by: VARTA Microbattery GmbH
Quality / Environmental Management

Contact: https://www.varta-microbattery.com/contact/?lang=en

Updates: Current SDS can be downloaded from VARTA’s web page.