

Leclanché Cell 1002897

Instruction sheet

11/22 HJB



- ① Carbon electrode with 4-mm socket
- ② 4-mm socket
- ③ Lid
- ④ Zinc electrode
- ⑤ Glass vessel

1. Safety instructions

- Caution! Heavy metal salts are toxic.
- Safety goggles are a must when working with acids or alkalis.
- Students must always be thoroughly informed about the hazards of the chemicals used.
- Leaking fluid can cause permanent stains and holes in clothing.
- The apparatus must be thoroughly cleaned after the experiment.
- Applicable regulations must be strictly adhered to when disposing of the chemicals.

2. Description, technical data

The model for a dry cell battery was invented around 1860 by French chemist Georges Leclanché. The cell named after him, which continues to be the most common battery even today, uses manganese dioxide and is not rechargeable. The Leclanche cell consists of a cylindrical zinc electrode, a carbon electrode, a ceramic cell and a glass vessel. The cell as supplied has no filling. When filled, the Leclanche cell provides a voltage of approx. 1.5 V.

Connections: via 4-mm sockets

Dimensions: 175 mm high, 65 mm Ø

3. Scope of delivery

- 1 Glass vessel
- 1 Clay cylinder
- 1 Lid
- 1 Zinc electrode with socket
- 1 Carbon electrode with socket

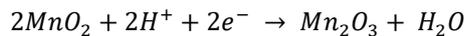
4. Principle

The combination of two half-cells for the purpose of converting chemical energy into electrical energy is called a galvanic cell. In a Leclanché cell, a zinc electrode forms the negative pole and a carbon rod with the manganese dioxide MnO_2 coating forms the positive pole. In the space between, ammonium chloride is used as an electrolyte. The ensuing chemical reaction chiefly results from the oxidation of zinc and reduction of manganese dioxide.

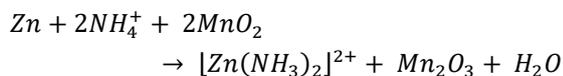
Oxidation:



Reduction:



Redox reaction:



The reactions shown here are simplified. They are far more complicated in reality. The reaction ceases when the manganese dioxide has been used up.

- ① Ceramic cylinder
- ② Manganese dioxide coating
- ③ Carbon electrode
- ④ 4-mm socket
- ⑤ Glass vessel
- ⑥ Zinc cylinder
- ⑦ Ammonium chloride solution

5. Operation

To construct a Leclanché cell requires the following:

Ammonium chloride solution (NH_4Cl), approx. 20%

Manganese dioxide (powder) (MnO_2)

Graphite (powder)

- Mix the manganese dioxide powder and some graphite powder in a beaker. Then add the ammonium chloride solution and stir the mixture to form a paste.
- Position the zinc electrode into the glass vessel and place the ceramic cylinder inside.
- Position the carbon electrode in the center of the ceramic cylinder and fill up all remaining space with the manganese dioxide paste.
- Fill up the glass vessel with the 20% ammonium chloride solution and cover it with the lid.
- The apparatus and electrodes must be thoroughly cleaned immediately after the experiment.
- Chemicals which cannot be reused must be stored in special vessels and disposed of in an orderly fashion afterwards, strictly adhering to applicable regulations.

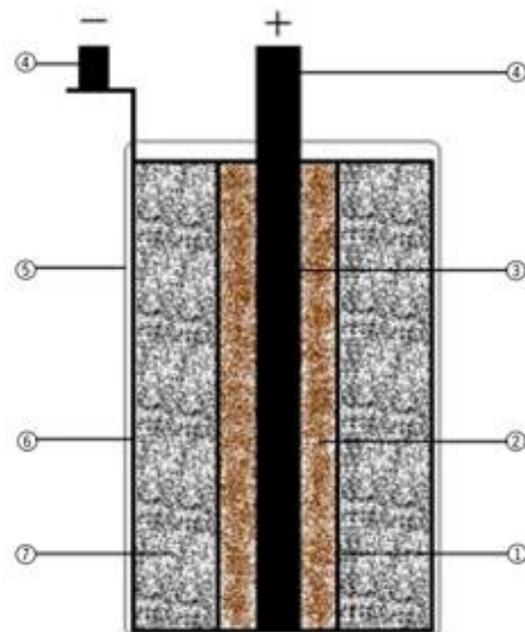


Fig. 1: Leclanché cell