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Metal electrodes

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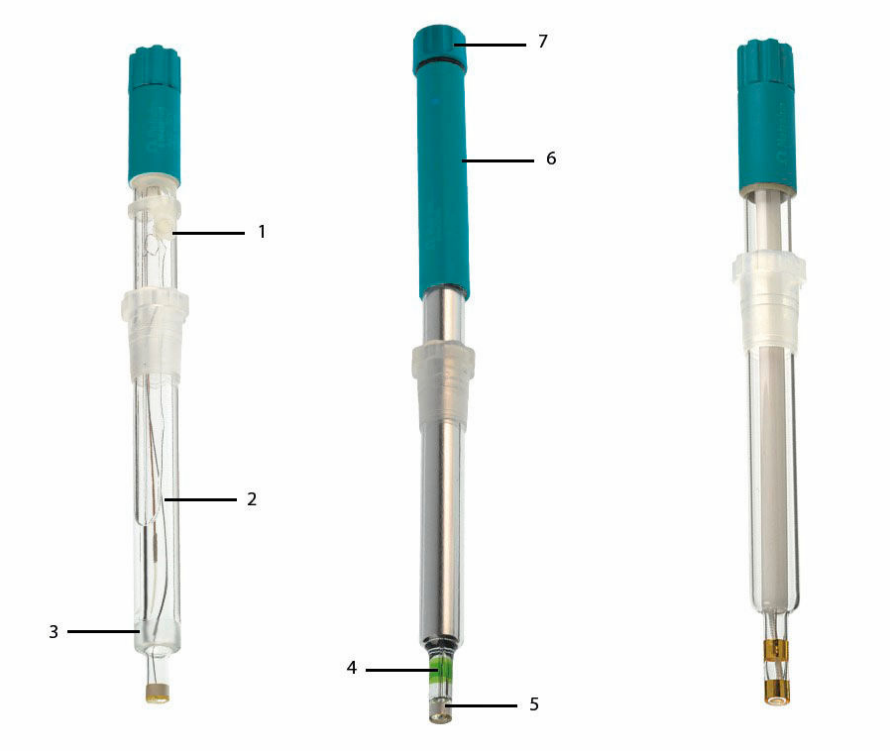

1 Metal electrodes

1.1 General

Immediately after receiving the electrode, check it to make sure that it works properly. Electrodes that do not work properly must be sent back for warranty processing within two months (starting from the day of delivery). If the defect is proven to be due to a material or manufacturing defect, the electrode will be replaced at no charge. Shipping costs are borne by the customer.

Pt and Au electrodes

These electrodes are suitable for redox measurements and redox titrations. Double Pt electrodes and double Au electrodes are also suitable as polarizable electrodes.

Coated Ag electrodes

The electrolytic coating with AgCl, AgBr, AgI or Ag_2S is described in the Metrohm Application Bulletin no. 25. Already coated electrodes can be obtained directly from Metrohm.

1.2 Measuring

Rinse the electrode after measuring. The electrode's surface must be kept clean and free from grease at all times (do not touch).

Combined electrodes with diaphragm

The filler opening (**1**) must be open during measurements. If necessary, refill reference electrolyte (**2**) up to the filler opening (**1**). Use the reference electrolyte indicated on the electrode.

1.3 Cleaning

CAUTION

Do not use the ultrasonic bath for electrodes, as they may be damaged by such a treatment.

Rinse the electrode with water after each measurement. If the contamination is particularly persistent, the metal ring may be cautiously cleaned with a moist paper towel and toothpaste or the polishing set (6.2802.000). Frequent abrasive cleaning is not recommended. Trichloroethylene can be used for degreasing.

Titrodes
Take care not to damage the glass membrane (**4**) while cleaning the metal ring (**5**).

Combined Ag ring electrode
To clean diaphragms (**3**) that are blocked with silver chloride precipitate, immerse the electrode with closed filler opening (**1**) in concentrated ammonia solution for approx. two hours, rinse it with distilled water and immerse it in potassium nitrate c(KNO_3) = 1 mol/L for several hours. Subsequently, replace the reference electrolyte potassium nitrate c(KNO_3) = 1 mol/L.

1.4 Storing

Titrodes
Store in distilled water.

Combined electrodes
Store in reference electrolyte with closed filler opening (**1**). Combined Ag electrodes must be stored in potassium nitrate c(KNO_3) = 1 mol/L.

Combined Pt electrodes and Au electrodes must be stored in potassium chloride c(KCl) = 3 mol/L.

Separate metal electrodes
Store dry and protected in the storage vessel.

iTrode and dTrode models
The memory chip that is integrated in the electrode head (**6**) enables the storage of important sensor data such as article number, serial number, calibration data and calibration history.

When the electrode is not in use, screw the protective cap (**7**) onto the electrode head to prevent contamination (water, solvent, dust, etc.) of the electrode head as well as exposure of the contact pins.

1.5 Troubleshooting

Double Pt sheet electrode
If the potential jumps are low, the adjustment times long and the titration curves flat, use one of the following regeneration procedures:

- Dissolve a spatula tip of sodium sulfite in 50 mL of deionized water and immerse the electrode in this solution for one hour.
- Electrolytic hydrogen deposition on the surface:
  - Connect the double Pt sheet electrode to be treated to the negative terminal (cathode) of a DC source providing 4.5 to 6 V (e.g. a battery). Connect another Pt (wire) electrode or an iron nail to the positive terminal (anode). Do not use copper, as this would result in copper deposits on the platinum.
  - With the potential applied, immerse both electrodes in a stirred H_2SO_4 solution (approx. 2 mol/L). Hydrogen should form on the cathode (and oxygen on the anode, accordingly). This is indicated by bubble formation.
  - After approx. five minutes, remove the electrodes from the solution while the potential is still applied and thoroughly rinse with deionized water.
- Titration with c(I_2) = 0.01 mol/L:
  - Weigh approx. 50 mg $Na_2S_2O_3$ * 5 H_2O in a titration vessel. Add 5 mL c(CH_3COOH) = 2 mol/L and dilute the mixture to approx. 80 mL with deionized water.
  - Titrate the solution bivoltametrically (MET Ipol) with c(I_2) = 0.01 mol/L until after the equivalence point.
  - Apply this titration procedure multiple times until the titration curves are steeper again.