

## Application Bulletin 25/4 e

# Coating on silver electrodes

### Branch

General analytical laboratories

### Keywords

Precipitation titration; coating; branch 1; Ag Titrode; Ag ring electrode; 6.0430.100; 6.0450.100

### Summary

Ag electrodes are used for the indication of the potentiometric endpoints in precipitation titrations between silver and halide or sulfide ions. A coating on the silver ring may increase the sensitivity of the electrode and can thus reduce the limit of detection. This is why a variety of coated Ag electrodes are commercially available.

This bulletin describes how the silver ring of Ag electrodes can be coated with AgCl, AgBr, AgI or Ag<sub>2</sub>S by electrolysis.

### Instruments

- DC source (e.g., battery)
- mA meter

### Electrodes

Ag Titrode	6.0430.100 6.00430.100
Micro Ag Titrode	6.0433.100
Ag ring electrode	6.0450.100 6.00450.100
Separate Ag ring electrode	6.0350.100 6.00350.100
Pt rod electrode as auxiliary electrode	6.0331.000 or 6.1247.010 + 6.1241.040

### Reagents

- Hydrochloric acid,  $c(\text{HCl}) = 0.1 \text{ mol/L}$   
for AgCl coating
- Hydrobromic acid,  $c(\text{HBr}) = 0.05 \text{ mol/L}$   
for AgBr coating

- Hydriodic acid,  $c(\text{HI}) = 0.025 \text{ mol/L}$   
for AgI coating
- Sodium sulfide, Na<sub>2</sub>S  
for Ag<sub>2</sub>S coating

### Solution

Na <sub>2</sub> S solution	$c(\text{Na}_2\text{S}) = 0.1 \text{ mol/L}$ , 100 mL deion. water is added into a 250 mL volumetric flask. 18.5 g Na <sub>2</sub> S is weighed out and added to the 250 mL volumetric flask. After complete dissolution of the Na <sub>2</sub> S, the flask is filled up to the mark with deion. water.  Attention: No metal spatula should be used for the Na <sub>2</sub> S!
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### Electrode preparation

To clean the Ag surface, it is rubbed with a polishing cloth (e.g., polishing set 6.2802.000) and degreased with dishwashing liquid or acetone. Afterwards the electrode is rinsed thoroughly with deion. water.

### Procedure

The silver electrode is connected to the positive pole of the setup (see Fig. 1), whereas a plain Pt electrode is connected to the negative pole to serve as auxiliary electrode.

In case of an Ag Titrode, the outer conductor should be connected to the positive pole. Care should be taken not to connect the pH membrane (inner conductor of the electrode head) to the positive pole.

In case of an Ag ring electrode, the inner connector should be connected to the positive pole, respectively.

The electrode is electrolyzed for about 2 h using a current density of 1 mA/(cm<sup>2</sup> electrode surface) until a complete and uniform coating is observed.

Afterwards the system is switched off and the electrode is thoroughly rinsed with distilled water.

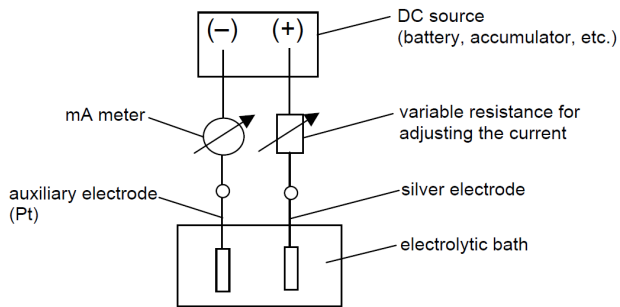


Fig. 1: Setup for the coating of the silver electrode

### Comments

- The coating becomes better if a low current density is used for the electrolysis and, in return, is applied for a longer time period.

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