Electrodes in Glass

‘Norwood’ Type

EM1800-001 Set of 4 Electrodes with Bracket

Description:

Each electrode is mounted in its own glass sleeve with protruding tip for connection.
The set permits various experiments in electrolysis to be performed including the identification of the products of electrolysis.

The space in the glass sleeves permits the products formed during electrolysis or Redox to be retained and later removed for identification. The glass sleeve is designed to be filled with a pipette and will not lose its solution when gently inverted. To remove the solution for cleaning etc, the electrode must be gently shaken.

The stainless steel electrode and the platinum electrode are used for electrolysis and the two carbon electrodes are used for EMF or Redox cells.

WARNING: **For experiments in electrolysis etc. always wear eye protection and take care that the acids used in the experiments do not contact the skin.**

Contents of Electrode Set:

- 2 pcs Carbon electrodes in glass PA1800-002
- 1 pce Stainless steel electrode in glass PA1800-003
- 1 pce Platinum electrode in glass PA1800-004
- 1 pce Electrode stand, plastic coated PA1800-005

Length: 75mm	Width: 30mm	Height: 120mm	Weight: 250g

Additional Equipment Required:

- Chemicals - Saturated sodium chloride solution, Copper sulphate solution, Potassium iodide solution, Hydrochloric acid, Phenolphthalein solution
- Power Supply: 0-12 V.DC. LB2633-001
- Glass or plastic beaker: 50 ml
- 2x Copper strips: 7.5cm x 1cm
- Wooden splints
- Student Voltmeter: 0-6V.DC.

Useful Experiments:

Electrolysis:

1. Make up a solution of about 30ml of dilute sulphuric acid in a clean 50ml beaker. Place the 50ml beaker on the base of the electrode stand.
2. Using a pipette, fill the platinum electrode and the stainless steel electrode assemblies with the dilute acid. When full, quickly but gently invert each electrode assembly and insert through the hole in the stand and into the beaker. During inversion, notice that the design of the mouth of the tube prevents the liquid dribbling out.
3. Connect the platinum electrode to the positive terminal of the 12V.DC. supply and the stainless steel electrode to the negative terminal. The platinum electrode is the anode and the stainless steel electrode is the cathode.
4. Switch on the power supply and allow the gas bubbles to rise and collect in the glass tube surrounding the electrode. Sufficient gas for identification should be formed in about 15 to 20 seconds. Then switch off the power supply and disconnect the electrodes.
5. Withdraw the platinum anode unit from the beaker, place a cover over the open mouth and invert it slowly so the gas is at the mouth under the cover.
6. Remove the cover and, with a glowing splint, test the gas bubble. Can you identify the gas ?
7. Repeat the above with the stainless steel cathode. Can you identify the gas ?
8. Is there any visible change in the electrolyte solution remaining in the glass sleeves ?

Oxidation-Reduction Reaction:

1. Use the two carbon electrode assemblies. Fill one assembly with the oxidiser and the other one with the reducer.
2. As described above, invert both the electrode assemblies and insert them in the 50ml beaker containing potassium chloride solution.
3. Connect a voltmeter between the terminals of the electrodes and measure the EMF.
4. Connect a wire between the electrodes so that a short circuit current can flow. In the beaker, observe the reaction in the solution.

Other Experiments:

1. Use the carbon electrodes and concentrated hydrochloric acid as the electrolyte solution. Test the anode for chlorine gas using litmus paper.
2. Use the carbon electrodes and a saturated sodium chloride solution as the electrolyte. Test the anode for chlorine gas and the cathode for hydrogen. Test the liquid remaining in the cathode assembly with phenolphthalein.
3. Use the carbon electrodes and a potassium iodide solution as the electrolyte. Test the anode for oxygen. Test the liquid remaining in the cathode assembly with phenolphthalein.
4. Use stainless steel electrodes (borrow one from another kit) and a copper sulphate solution as the electrolyte. Test the anode for oxygen.
5. Use the copper strips as electrodes and use a copper sulphate solution as the electrolyte. What is the reaction ?
6. When using the copper sulphate solution as the electrolyte and the stainless steel electrodes, did the cathode become coated with copper ? Can an electrolytic deposition be removed ? If copper was deposited on the stainless steel electrode, how would you remove it by electrolysis ?

Keeping your records:

Prepare a summary of your experiments. List the type of electrodes used and the electrolyte, together with the observations you made.

ALWAYS WASH THE INSTRUMENTS THOROUGHLY BEFORE STORING AWAY.

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