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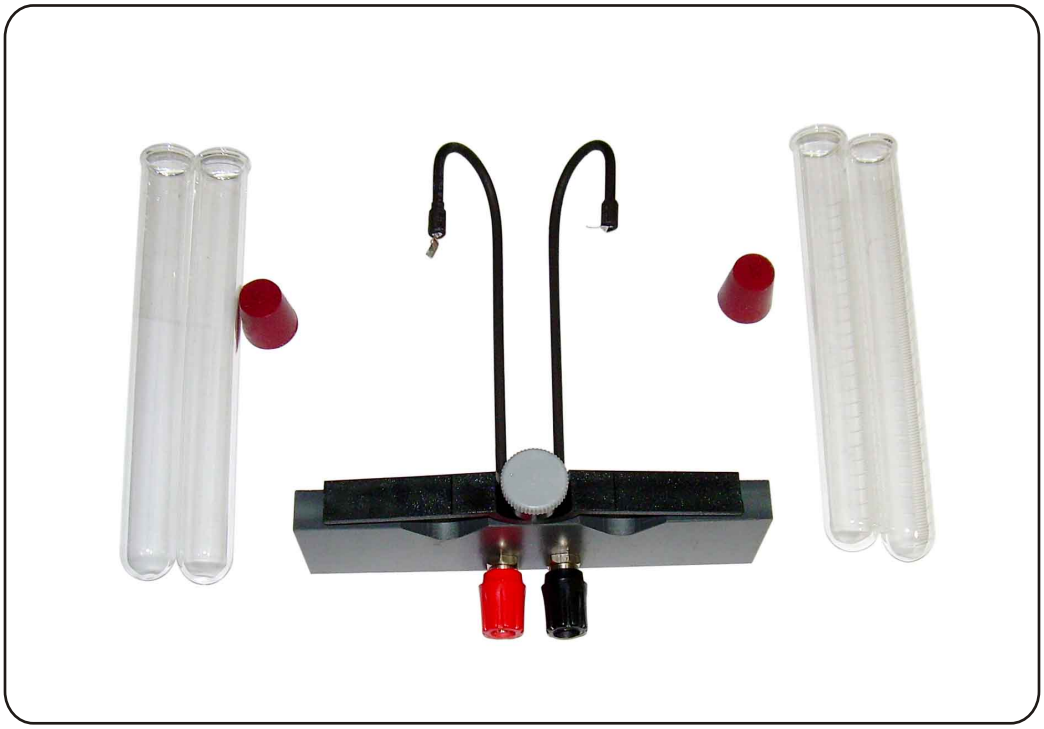
BROWNLEE WATER ELECTROLYSIS APPARATUS

CAT NO. PH0941B



Instruction Manual

INTRODUCTION

Brownlee's Electrolysis Apparatus is used to demonstrate that electrically conductive liquids can be decomposed and resolved into their constituent elements by means of a unidirectional electric current. The gaseous components formed by this method can be trapped, and their relative volumes estimated.

Although designed primarily to electrolyze water, this apparatus can be used with many other aqueous solutions. For examples solutions of ammonia, hydrochloric or nitric acids, and sodium chloride. Other solutions, such as those of antimony trichloride, copper sulfate, and silver nitrate, can be used to demonstrate the phenomenon of electroplating with the help of two clips.

ADDITIONAL ACCESSORY

Required For Experiment :

- A power source of 12VDC. You may use a 12V battery (with a knife switch for opening and closing the circuit).
- A One Litre Capacity Jar.
- Safety goggles and rubber gloves.
- Sulfuric acid for preparing a 2% solution.
- A small beaker.
- A Plastic 6-inch English-metric ruler.
- Wax tapers.
- A nonflammable support for a lighted taper.

EQUIPMENT INSTALLATION

Take the battery jar and place it on a table. Set the electrolysis apparatus on the rim of the battery jar.

If Power Supply used then connect wire with DC Power Supply in case of battery used knife switch Connect Cable from the binding posts to the DC Power source - 12V battery or power supply. If a battery is used, install a knife switch for opening and closing the circuit. Make sure all power to the unit is off at this point.

Prepare a 2% solution of sulfuric acid in a large enough quantity to nearly fill the battery jar.

Be sure you are wearing protection gloves, release the spring clip holding one of the test tubes, lift the tube above the electrode, and remove the tube. Dip a small beaker into the battery jar and fill the test tube with the acid solution. While holding a thumb over the mouth of the filled tube, invert the tube and lower it into the jar. Remove the thumb from the test tube's mouth when it is below the surface of the solution. Restore the test tube to its original position, so that it is supported by the spring clip and surrounding the platinum electrode. Repeat this procedure with the other test tube.

Slide the plastic 6-inch scale behind the test tube, the edge of the porcelain support, and the spring clip. Adjust the scale so that the lowest graduation is on a level with the top most portion of the test tube. You can now take off your protection gloves.

EXPERIMENT

When using a power supply, make sure the switch is in the off position. and when using a battery setup, leave the knife switch open.

Start the demonstration by either turning on the power supply or by closing the knife switch.

When nearly all of the solution in one test tube has been displaced by gas, switch off the power supply or, if the battery setup is used, open the knife switch.

Graduation mark on the scale at the interface of the gas and liquid phases in each test tube.

Light a taper and rest it on its nonflammable support.

Be sure to wear your protective gloves and goggles, grasp the test tube containing the larger quantity of gas, then release the spring clip, and lift the test tube from the solution. While the test tube is still in the inverted position, bring its mouth over the lighted taper. A pale blue flame indicates the gas is hydrogen. Now blow out the taper flame, but leave the tip of the taper glowing.

The other test tube, release the spring clip and lift the tube from the solution. Keeping the test tube in the inverted position, bring its mouth over the glowing taper. If the end of the taper bursts into flame, the gas is oxygen.

When you have completed the electrolysis process, turn off Power Supply Switch or, if when battery used, open the knife switch.

Lift the porcelain support from the battery jar. Using a dampened cloth or sponge, wipe the insulated wire leads and platinum electrodes that have been in the acid solution. Dispose of the 2% sulfuric acid solution in accordance with the sanitation rules and regulations in force in your community.

Rinse the empty battery jar and test tubes in the sink with cold water and dry them. Replace the test tubes in the spring clips and replace the electrolysis apparatus on the rim of the battery jar.

BRIEF

Water, is a very poor conductor of electric current; a weak aqueous solution of sulfuric acid works much better, When an electric current flows through an electrically conductive liquid, hydrogen is formed at the cathode. The hydrogen bubbles upward and displaces the liquid in one test tube. Oxygen is formed at the anode, and bubbles upward to displace the liquid in the other test tube. Although the sulfuric acid dissociates, it is not exhausted in the process. In this respect, it can be considered a catalyst.

When the procedure of resolving water into its components is demonstrated, additional experiments with this apparatus can be conducted. For example, it is possible to decompose solutions of ammonia, hydrochloric acid, or sodium chloride. It is also possible to deposit or electroplate metals from solutions of sliver nitrate, copper sulfate, or antimony trichloride.

MAINTENANCE

The Brownlee's Electrolysis Apparatus needs no special maintenance. However, you should clean the electrodes after the apparatus has been used for electroplating. To remove silver, copper, or antimony plating from the electrodes, follow this procedure:

Loosen the knobs on the terminal and remove the wire cable. Hold the leads by the two-hole couple insulator and remove them from the bell jar.

Be sure to wear protective gloves and goggles, carefully pour concentrated sulfuric acid to a depth of about half an inch into a 100ml beaker.

Fill a second, larger beaker (about 500ml size) with tap water.

Dip the plated electrode (cathode) into the sulfuric acid, remove the electrode, and then plunge it into the second beaker previously filled with water.

If you are going to store the apparatus, let the electrodes dry. If you will be using the apparatus again, replace the electrodes in it.

As in the previous experiment, dispose of all solutions in accordance with government regulations in your area.

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