

Make Your Own Tiny Battery: Short-on-time Inquiry Lab

Overview

Assemble your very own handheld, tiny battery with this student lab kit! Batteries have tremendous impacts in our everyday lives. Delve into galvanic and electrolytic cells—how are these types of cells related to batteries? Start making connections. A few simple materials are provided in order to successfully complete the lab and the procedure guides you to ensure success. Enjoy this fun learning experience and take pride in your tiny battery creation!

Focus on Science Practices

SEP 1 Asking Questions and Defining Problems

SEP 2 Developing and Using Models

Materials Per Group

- Copper(II) sulfate solution, CuSO_4 , 1.0 M, 5 mL
- Paper towels
- Sodium sulfate solution, Na_2SO_4 , 1.0 M, 5 mL
- Pipet
- Copper foil conductive adhesive, Cu, 2 cm piece, 2
- Ruler
- Deionized or distilled water
- Sandpaper
- Filter paper, 1
- Scissors
- Graduated cylinder, 10-mL, 1
- Tweezers
- LEDs, clear, red, 2
- Weigh boats, medium, 2
- Magnesium ribbon, Mg, 2 cm piece, 2

Safety

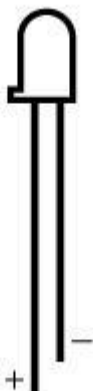
The copper(II) sulfate solution is harmful if swallowed and causes serious skin and eye irritation. The sodium sulfate solution may be harmful if in contact with skin. Magnesium ribbon is a flammable solid. Wear chemical splash goggles, chemical-resistant gloves and a chemical-resistant apron. Wash hands thoroughly with soap and water before leaving the laboratory. Please follow all laboratory safety guidelines.

Procedure

Part I. Battery Materials Preparation

1. Gently polish both negative and positive terminals on the LEDs with the sandpaper (see Figure 1).

Figure 1

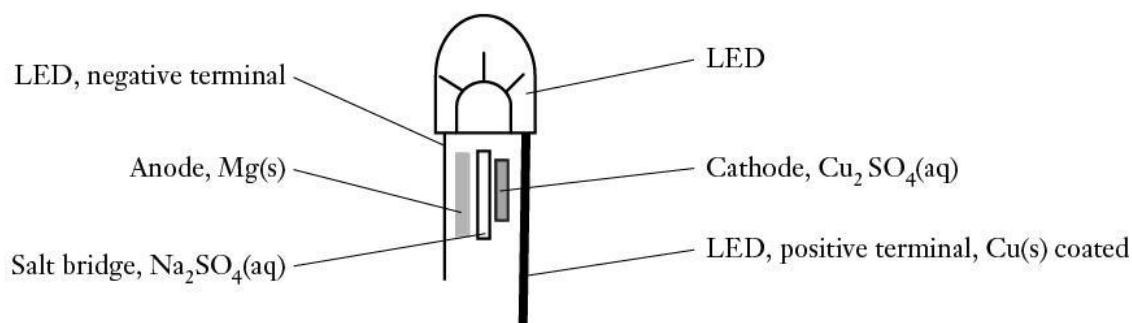


2. Make sure the copper conductive adhesive tape pieces and magnesium metal pieces are 2 cm in length. Cut the pieces with scissors if necessary.
3. Cover the positive terminal of each LED (Figure 3) with the 2 cm piece of the adhesive conductive tape. Sticky side should come in contact with positive terminal.
4. Cut square-shaped filter paper in the sizes below:
 - a. Cut 2 pieces of the blue copper(II) sulfate filter paper in about $\frac{1}{2}$ cm² in size.
 - b. Cut 2 pieces of the white sodium sulfate filter paper in about 1 cm² in size.

Part II. Battery Assembly

- Place all of the materials on the lab bench top. Materials include: prepped LEDs, magnesium metal pieces, and 2 each of copper(II) sulfate and sodium sulfate filter paper squares.
- Arrange the parts according to the diagram below (Figure 3).

Figure 3



- Squeeze the positive and negative lead with your thumb and index finger to create a “sandwich”.
- Add one drop of water to the filter papers and watch the LED illuminate red.

Analyze and Interpret

- SEP Define Problems** Define the terms *oxidation* and *reduction* and identify the oxidation reaction and the reduction reaction below.

