

Electrochemistry Buzzer

Voltaic Cells



Introduction

This electrochemical reaction will create quite a buzz!

Concepts

- Electrochemistry
- Chemical reactions

Materials

| | |
|-------------------------------------|--|
| Copper wire, 10 cm | Alligator clips with electric leads, 2 |
| Hydrochloric acid, HCl, 6 M, 100 mL | Beaker, 1-L |
| Magnesium ribbon, 10 cm | Electrochemical buzzer |
| Steel wool | Pencil |
| Water, tap | Pipet, Beral-type, thin stem |

Safety Precautions

Hydrochloric acid is severely corrosive; avoid all contact with body tissue. Wear chemical splash goggles, a chemical-resistant apron, and chemical-resistant gloves. Please review current Material Safety Data Sheets for additional safety, handling, and disposal information.

Procedure

1. Use the steel wool to clean the copper wire and the magnesium ribbon.
2. Coil the copper wire around the pencil. Do the same with the magnesium ribbon.
3. Place the magnesium electrode and the copper electrode in a 1-L beaker filled with water so the two electrodes are not touching.
4. Attach an alligator clip lead to each electrode. Connect the leads to the electrochemical buzzer.
5. When the apparatus is assembled, begin to add the hydrochloric acid with the pipet – slowly at first, then faster. As the hydrochloric acid is added to the water, the buzzer begins to buzz.

Disposal

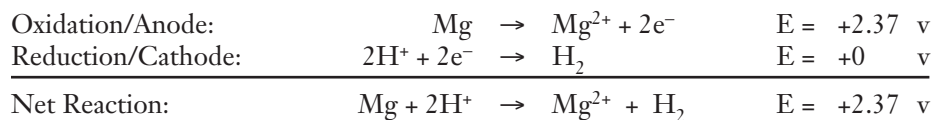
Dispose of the hydrochloric acid solution according to Flinn Suggested Disposal Method #24b. Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures governing the disposal of laboratory waste.

Tips

- You may wish to connect the alligator leads to a flashbulb for another demonstration.
- A 3 V Range Mini-buzzer can be found and purchased from Unicorn Electronics.

Discussion

Magnesium ribbon is oxidized and forms the anode. This oxidation of magnesium allows for some electrons to travel through the electric leads and through the buzzer to the copper cathode, where H^+ is reduced.



When magnesium reacts with the acid, the surge of electrons through the buzzer provides sufficient energy to cause the buzzing sound.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12

Evidence, models, and explanation

Content Standards: Grades 9–12

Content Standard A: Science as Inquiry

Content Standard B: Physical Science, chemical reactions, interactions of energy and matter

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Electrochemistry Buzzer* activity, presented by Jeff Hepburn is available in *Voltaic Cells*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Electrochemistry Buzzer* are available from Flinn Scientific, Inc.

| Catalog No. | Description |
|-------------|---|
| C0146 | Copper, Wire, 16 gauge, 4 oz |
| H0033 | Hydrochloric Acid, 6 M, HCl, 500 mL |
| M0139 | Magnesium Ribbon, 12.5 g, 458 |
| S0128 | Steel Wool, 454 g |
| AP5335 | Alligator Test Clip |
| AP6052 | Alligator Cord |
| GP1040 | Beaker, 1-L |
| AP1718 | Pipet, Beral-type, Thin Stem, Pkg of 20 |

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.