

Name: _____ Class: _____ Date: _____

Building the Best Battery

Learner Outcomes:

- Investigate and evaluate the use of different electrodes, electrolytes and electrolytic concentrations in designing electrical storage cells.
- Modify the design of an electrical device, and observe and evaluate resulting changes



Key Terms:

Electrode

Dry cell

Secondary cell

Electrolyte

Wet cell

Rechargeable cell

Electrochemical cell

Primary cell

Voltage

Background Information: All electrochemical cells require an electrolyte and two different types of metal electrodes. The voltage produced by a particular cell depends upon the types of chemical reaction, and thus reactants in the cell.

Research Question: What combination of electrodes and electrolytes produce the greatest voltage?

Materials:

zinc (Zn) strip

2 wires with clamps

Vinegar

copper (Cu) strip

Voltmeter

Dilute HCl

nickel (Ni) strip

Distilled water

Dilute KOH

aluminum (Al) strip

Salt water

Dilute CuSO_4

paper clips

Sugar water

2 x 250 mL beakers

Lemon juice

This investigation / activity has been adapted from:

Mah K, Martha J, McClelland L, et al. *Science in Action 9*. Toronto, ON: Addison Wesley.

Experimental Design:

Manipulated Variable:

Responding Variable:

Controlled Variables:

Prediction:**Procedure:**

1. Attach the clamps to the copper and zinc electrodes and place the electrodes in a beaker.
2. Pour some distilled water into the beaker so that the bottom 1/3 of each electrode is immersed.
3. Connect the wires to the voltmeter. (If you don't get a reading, try reversing the wires)
4. Making sure the electrodes don't touch one another, record the voltage.
5. Repeat steps 1-4 with using different electrode combinations (try at least 4).
6. Repeat steps 1-5 using different electrolytes.

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Observations:

Cell	Electrolyte	Electrode 1	Electrode 2	Voltage
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Analysis:

1. Were all of the liquids you tried electrolytes? Why or why not?

2. Why do some substances make better electrolytes than others? Explain.

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3. Were all of the metal combinations you tried equal in the voltages they produced?
4. Which was more effective at producing the highest voltage; the metal combination or the electrolyte used?

Conclusion:

Extension:

1. Car batteries are an example of a wet cell. Most batteries however, are classified as dry cells. Research the chemical composition of at least three different types of dry cells.

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