

Exploring Creation with Chemistry, 3rd Edition – Errata File

This file contains the corrections for the 7th Printing: January 2023 of the **Student Notebook**. The printing for the Student Notebook may not be the same as for the Textbook and Solutions and Tests Manual. Corrections for the Textbook and Solutions and Tests Manual are in separate files. (Posted July 2024)

Clarifications:

Pages 592-593 – Experiment 16.2, Materials List and Procedure Steps 5-10 were revised for clarity. See revised pages below.

Correction:

Page 92 – #10 b. configuration should be: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8 4p^6 5s^1$

(insert $3s^2$ after $2p^6$)

EXPERIMENT 16.2

Purpose:

To create a Galvanic cell from lemons.

DATE

Materials:

- 4 juicy lemons
- 4 copper pennies (Pennies from before 1982 have higher copper content. You can also use copper wire instead of a penny.)
- 4 two-inch zinc coated (galvanized) nails
- 5 small wires, ideally with alligator clips
- Voltmeter (optional)
- Pre-wired LED (Light Emitting Diode) bulb
- Safety goggles

Question:

Can you create a Galvanic cell battery from common household items that can light an LED bulb?

Procedure:

1. Squeeze the lemon gently with your hands or roll it on a table with some pressure to release the lemon juice. Don't rupture the lemon's skin.
2. Make a small penny-sized cut in the lemon and insert the copper penny into it with half of the penny sticking out.
3. Insert the galvanized nail into the other side of the lemon, ensuring that the nail does not touch the penny.
4. This is a single cell of a battery. The nail and the penny are the electrodes, and the lemon juice is the electrolyte.
5. If you have a voltmeter, connect one wire of the voltmeter to the nail and the other to the penny. Note what it reads. If you don't have a voltmeter, skip to Step 6.
6. Now try to connect one wire from the nail to the LED wire and another wire from the penny to the other LED wire. What do you see? This current is not enough to light an LED light. To have enough current, you will need to add more lemons
7. Create 3 more of the same lemon batteries.

8. Connect 5 wires in this order:

Wire 1: LED wire to galvanized nail in lemon 1

Wire 2: galvanized nail in lemon 1 to penny in lemon 2

Wire 3: galvanized nail in lemon 2 to penny in lemon 3

Wire 4: galvanized nail in lemon 3 to penny in lemon 4

Wire 5: galvanized nail in lemon 4 to LED wire

9. What do you see? **Record your observations in the data table.** Can you determine which is the cathode, and which is the anode in this experiment based on figure 16.3?

10. Clean up and return everything to the proper place.

Hypothesis:

DATA and OBSERVATIONS: