Name_____

Measuring the Mass of an Atom and Avogadro's Number
Dr. Slotsky Chemistry I

Part I: Setting Up Experiment

Take one beaker with 2 Zn strips. Mark the beaker with tape to indicate the positive **(+)** and negative **(-)** electrodes. Measure the mass of the **positive** Zn strip, in grams:

1) Mass of POSITIVE zinc strip (grams) _____

Replace the positive zinc strip in the beaker, and fill the beaker with 500 mL of tap water. Add 10 grams of Na_2SO_4 electrolyte and stir with a wooden stick to dissolve.

Wire the beaker into the circuit as directed by your instructor (ME).

2) Record time the experiment started _____

3) Record the CURRENT in Amps _____

4) Record time the experiment ended _____

During the experiment, someone should always be watching each beaker to ensure that short circuits (strips touching) do not develop, and that no open circuits (lost connection) happen. Someone should be watching the power supply and controlling the voltage knob to keep the current steady as instructed.

When the experiment is over (about 15 minutes), remove your positive Zn electrode. Wipe it with paper towels to remove any precipitate or other dirt. Weigh the Zn electrode:

5) Final mass of POSITIVE zinc strip (grams) _____

Name_____

Part II: Calculating the Mass of a Zn Atom

6) How many minutes did the experiment run? _____

7) How many seconds? (multiply previous line by 60) _____

8) Multiply seconds on Line 7 by Amps on line 3 to obtain total electrical charge in Coulombs _____

9) The charge on a single electron is 1.602×10^{-19} Coulombs. Divide line 8 by 1.602×10^{-19} to obtain the number of electrons in this experiment

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10) One Zn atom is converted into soluble Zn+2 ion for every TWO electrons in the circuit. Divide line 9 by 2 to obtain the number of Zn atoms in this experiment:

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11) How many grams of Zn were consumed in this experiment? Subtract Line 5 from Line 1: _____

12) Divide Line 11 by Line 10 to obtain the mass of a single atom of Zn:

_____

Part III: Estimating Avogadro's Number

One mole of Zn has a mass of about 65.4 grams. Given our estimate for the mass of a single Zn atom, we can estimate Avogadro's Number:

13) Divide 65.4 grams by Line 12 to estimate Avogadro's Number

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