Experiment 7......... Mole Ratios

Name ____ Per ___

PURPOSE: To perform a chemical reaction and find the ratio of moles of reactants and products.

In this experiment you will mass a sample of solid silver nitrate and prepare a water solution of it. You will aiso mass a piece of copper wire, place it in the solution, and observe its behavior. By massing the copper wire at the close of the experiment you will be able to investigate quantitatively any changes that occur.

PROCEDURE:

a. Obtain about 25 cm of Cu wire. Clean the wire with steel wool. Form a coil by wrapping the wire around a large test tube leaving a short handle of about 5 cm. See Fig 7-1.

Mass the copper coil to the nearest 0.01 g and record it and all future data in the data table below.

b. Mass a 250 mL beaker to the nearest 0.01 g.

Mass the vial of siiver nitrate, $AgNO_3$ provided by your instructor.

Caution: Silver nitrate reacts with skin and will stain it black. Be careful and avoid spillage on your skin and clothing. However, don't be alarmed if you discover dark spots on your hands-- they wear away in a few days. *Clean hands the day following this experiment indicate good laboratory technique.*

c. Fill the beaker half full with **DISTILLED** water (no tap water!). It is found in the 20 liter jug in the back. Add all of the $AgNO_3$ to the water. Stir gently with a glass rod until all of the $AgNO_3$ crystals have dissolved. Mass the empty vial and return it to the Boom or X **dry**. DO NOT WASH IT.

d. Bend the handle of the weighed Cu wire such that it can be hung over the edge of the beaker with the coil immersed in the $AgNO_3$ solution. Place the coil into the beaker and observe any changes that take place for several minutes at least. See Fig. 7-1 above. Observations:

e. Place the beaker and wire into your locker for next time.

NEXT TIME:

f. Very carefully open your locker and lift the beaker to the desk top. Observe what has happened in the beaker. Record your observations:

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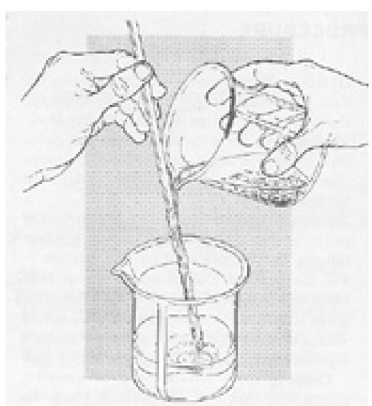
g. Shake the crystals off the coil and lift the coil from the solution. Use your wash bottle to rinse into the beaker any crystals which tend to adhere to the coil. See Fig. 7-2. Straighten and dry the coil with a paper towel. Mass it when dry. Then return it to the Boom or X.

h. Let the crystals settle in the beaker. Carefully decant the solution. Decant means to pour off liquid. leaving solid behind, as in Fig. 7-3.



Add 5 mL of distilled H_2O and stir gently until any flecks of copper disappear. Carefully decant again. Wash the residue with 10 ml of water and carfully decant. Wash and decant at least three more times.

i. After the final washing, the residue must be dried under the heat lamps in the fume hood until next time. BE SURE YOUR INITIALS ARE ON THE BEAKER!

Please bring the **Blue Solution**, $Cu(NO_3)_2$, to your instructor for proper disposal. Do **NOT** pour it down the sink!

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NEXT TIME:

Allow the beaker and contents to cool before weighing. Weigh the beaker of Ag crystals.

j. Save the beaker of crystals for Experiment 8.

Data Table:

1. Mass of Cu wire before reaction	g
2. Mass of Cu wire after reaction	g
3. Mass loss of Cu wire after reaction (1-2)	g
4. Mass of vial of $AgNO_3$ crystals	g
5. Mass of empty vial	g
6. Mass of $AgNO_3$ (4-5)	g
7. Mass of beaker and Ag crystals	g
8. Mass of empty dry beaker	g
9. Mass of Ag crystals (7-8)	g

CALCULATIONS:

Show clearly your Method of Solution (Hup, Two, Three, Four). (Hint: **mol = m/MM**)

1. Calculate the number of moles of Cu. (mass of Cu is #3 above, get MM from Periodic Table) (63.5 g/mol).

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2. Calculate the number of moles of Ag. (mass of Ag is #9 above), get MM from Periodic Table) (108 g/mol).

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3. Find the mole ratio of mol of Ag / mol of Cu. Round off to one significant figure.

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4. Find how many atoms Cu you used. [atoms = (mol)(6.02 X 10^{23} atoms/mol)].

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5. Find how many atoms Ag you used. [atoms = (mol)(6.02 X 10^{23} atoms/mol)].

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6. Find the ratio of atoms of Ag to atoms of Cu.

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7. How do the above two ratios compare and why?

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8. Write a critique of this lab.