Experiment 8

Mass Relationships of Reactions

Name _____ Per ___

PURPOSE: To find experimentally the mole ratios of reactants and products.

In this experiment you will use the silver you produced in Experiment 7 to form a water solution of silver nitrate, $AgNO_3$, by allowing the silver to react with nitric acid, HNO_3, you will next prepare a water solution of sodium chloride, NaCI, add it to the silver nitrate solution, and mass the products formed.
You will review and learn many techniques: careful weighing, decanting, filtering, washing. and drying. Carry them out well for it will be assumed in future work that you are able to use these techniques.
Record your data carefully and neatly. Take special care to show the units used in your measurements. Before you come to the lab to do an experiment, you should have planned what you are to do. This preparation will free your mind from mechanical details and allow you to concentrate on making the required observations in the allotted time.

PROCEDURE: GOGS ON, DEADLY ACID!!

Part I. Preparation of Solid Silver Nitrate from Metallic Silver.
a. **Refer back to Experiment 7 and record in the data table below, the mass of the beaker used (label this #l), the mass of the silver nitrate used, and the mass of the silver produced. DO THIS NOW!!!**

b. To the beaker containing the silver, add 10 mL of nitric acid, labeled 6M HNO_3. **GOGS ON!** Identify your beaker with your initials and leave it in the fume hood overnight to be evaporated to dryness. Observe the reaction.

NEXT TIME:

c. When it is dry, mass the beaker, **Number 1**, which now contains $AgNO_3$. *Remember the caution given in Experiment 7 concerning the handling of silver nitrate.* Record the mass into the data table below.

Part II. The Effect of Adding a Solution of Sodium Chloride to a Solution of Silver Nitrate.

a. Add 15 mL of distilled H_2O to the $AgNO_3$ in **beaker #1**.

b. Stir until no more change takes place.

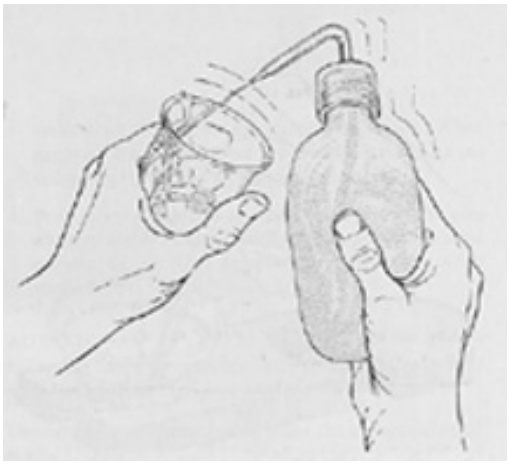
c. Label a dry 100 mL **beaker as #2, put your initials on it,** and mass it to the nearest 0.01 g. Record the mass in the data table below.

d. Place a weighing paper on the electronic balance, press **Zero** (or **Tare**) to zero the weight, and with a spatula carefully place **between** 2 and 3 g of NaCl onto the paper. Record the exact mass of the NaCl to the nearest 0.01g in the data table. Add the NaCl to **beaker #2**.

e. Add 15 mL of distilled water to the solid NaCl. Stir until no more change takes place.

f. While stirring the $AgNO_3$ solution in **beaker #1**, slowly add the NaCl solution from **beaker #2**.
Note the result:

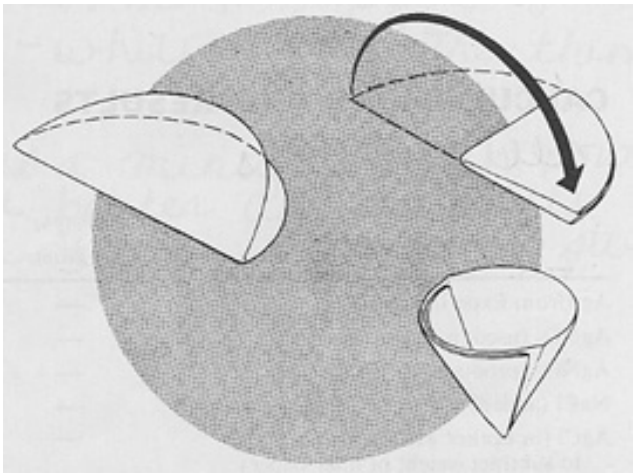
The white ***precipitate*** (solid) produced is the compound silver chloride, AgCl. Rinse the empty **beaker #2**, with 5 mL of distilled H_2O. See Fig 8-3



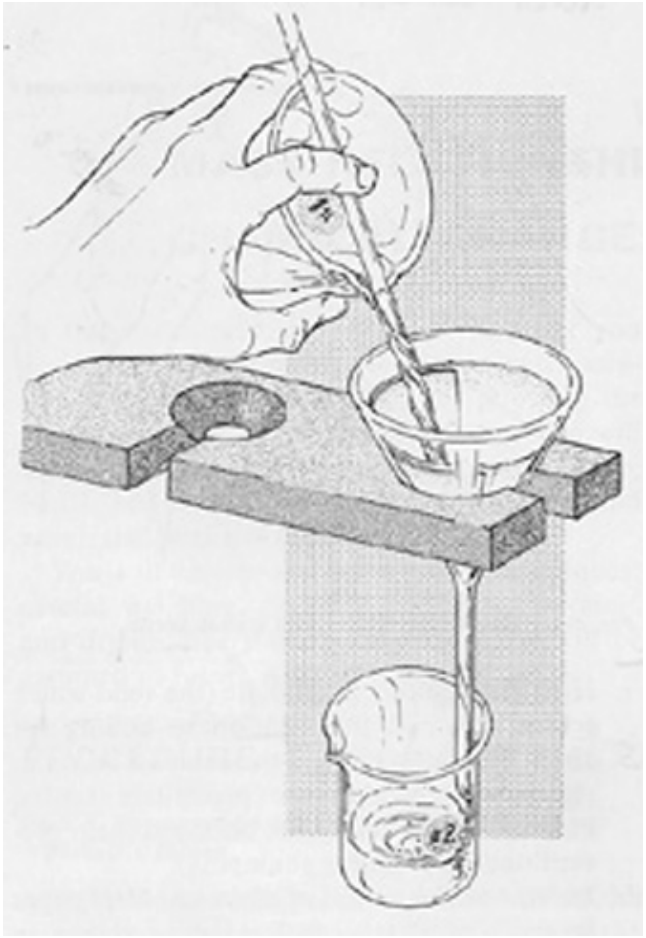
Add the rinse water to the mixture in **beaker #1**. Rinse **beaker #2** again with distilled water and this time discard the rinse water. The clean beaker will be used again in step i.

g. Heat the resulting precipitate and the solution to boiling until the precipitate settles (about 2 minutes).

h. Obtain a piece of filter paper from Boom or X, determine its mass to the nearest 0.01 g, and record it in the data table. Fold it as shown in Fig. 8-4. (a cootie).



Fit it into a funnel and moisten the paper with some distilled water from a wash bottle to make it stick to the glass. Set up the funnel for filtering as shown in Fig. 8-5.



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i. Place **beaker #2** under the funnel. The tip of the funnel should touch the beaker so a steady stream can run down the side. Decant the clear liquid from **beaker #1** into the funnel, pouring it into the funnel along a glass rod. A small amount of the precipitate may transfer to the filter paper, but try to keep most of it in the beaker where it can be washed more readily.

j. Wash the precipitate in the beaker with 15 mL of distilled water, stirring with a glass rod to aid the washing. Decant the wash water into the funnel. Repeat the washing procedure with another 15 mL of water. Decant the wash water again into the funnel.

k. After the filtration is complete, place the filter paper and any solid it contains in **beaker #1** containing the precipitate.

l. Place both samples, the filtrate in **beaker #2** and the wet precipitate in **beaker #1** in the fume hood for evaporation and drying overnight. ***Be sure each beaker has your initials on it!!***

NEXT TIME:
m. If a beaker still contains liquid, it will be necessary to ***very carefully*** dry it over a burner with **GOGS ON!** This must be done very slowly so that the crystals which will form will not burn. Watch out for ***decrepitation***, the exploding of crystals as the trapped water inside changes to steam (like popcorn). This may take about 30 minutes. Mass both dry samples and record their masses. *Return the silver chloride to the instructor.*

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DATA TABLE:

1. Mass of Ag from Experiment 7	g
2. Mass of $AgNO_3$ used in Experiment 7	g
3. Mass of beaker #1	g
4. Mass of beaker #1 and solid $AgNO_3$	g
5. Mass of beaker #1, filter paper, and solid AgCl	g
6. Mass of beaker #2	g
7. Mass of solid NaCl	g
8. Mass of filter paper	g
9. Mass of beaker #2 and precipitate ($NaNO_3$)	g

CALCULATIONS TABLE: On the back, show your calculations (hup, two, three, four).

Data for Calculations	Mass in grams	Number of Moles
Ag from Experiment 7 (#1 above)	.	.
$AgNO_3$ used in Experiment 7 (#2 above)	.	no entry
$AgNO_3$ produced in Experiment 8 (#4 - #3)	.	.
NaCl used in Experiment 8 (#7)	.	.
AgCl in beaker #1 (sans filter paper) (#5 - #3 - #8)	.	.
Precipitate in beaker #2 (#9 - #6)	.	no entry

After massing and recording the data, you may discard the filter paper and wash out the beakers.

ON THE BACK, ANSWER THE FOLLOWING QUESTIONS:

1. Compare the mass of $AgNO_3$ produced in this experiment with that used in Experiment 7. Account for similarities and differences.

2. a. Compare the sum of the masses of the $AgNO_3$ and NaCl used with the sum of the masses of the AgCl and precipitate in beaker #2.
b. What is the significance of these results? $AgNO_3 + NaCl \rightarrow NaNO_3 + AgCl_{(s)}$

3. a. Compare your results for the number of moles of silver used, of silver nitrate produced, in Part I, and of silver chloride produced in Part II by computing the ratio between the moles of silver and each of the other substances, $AgNO_3$ and AgCl. Use the nearest whole number to express your results. b. What can you conclude about the number of moles involved in this series of chemical changes?

4. Silver nitrate is a white solid. How do you account for any color which may be present in your sample?

Write a CRITIQUE for this lab: