Name: _____ Date:_____ _____/ 20

SMALL-SCALE LAB

Measuring Mass as a Means of Counting

BACKGROUND –When working with chemicals, it is important for chemists to know how many particles they are using in any given reaction. Since they cannot directly count these particles, they can by using a mass scale, indirectly count them.

If we know the mass of a sample of a compound, and its molar mass, we can calculate how many moles of the compound are present in the sample. If we know the number of moles of the compound, we can in turn, calculate how many particles are in that compound, and even the number of atoms of each element.

PURPOSE - To determine the mass of several chemical compound samples and use the data to count atoms.

SAFETY – Wear safety glasses and follow standard safety procedures for the laboratory

MATERIALS

Pencil and paper	Triple-beam balance
Chemicals as follows:	Weighing papers for dry chemicals
H_2O, NaCl, $CaCO_3$	Weighing cup for water

PROCEDURE

Using the triple-beam balance, measure the mass of one level teaspoon of sodium chloride (NaCl), water (H_2O), and calcium carbonate ($CaCO_3$), recording up to 1/100 of a gram, in the table below. Subtract the mass of the weighing papers and cup from your recordings.

	H_2O(l)		NaCl(s)		$CaCO_3$(s)		
Mass (grams)							
Molar Mass (g/ mol)							
Moles of each compound							
Moles of each element	**H**	**O**	**Na**	**Cl**	**Ca**	**C**	**O**
Number of atoms of each element							

ANALYSIS

Using your data, record the answers to the following questions in or below your data table.

1. Calculate the moles of NaCl contained in one level teaspoon as follows below, then record this in the table above.

Moles of NaCl = (_____ g NaCl) $\left(\frac{1 \text{ mol NaCl}}{58.5 \text{ g NaCl}}\right)$

2. Repeat Step 1 above for the other compounds. Use the periodic table if necessary to calculate the molar mass of water and calcium carbonate.

Moles of H_2O:

Moles of $CaCO_3$:

3. Calculate the moles of each *element* present in the teaspoon-sized sample of H_2O as follows:

Moles of H = (_____ mol H_2O) $\left(\frac{2 \text{ mol H}}{1 \text{ mol } H_2O}\right)$

Repeat this for the # of moles of O in H_2O, and record in the table above.

4. Repeat Step 3 for the other two compounds in your table.

NaCl:

$CaCO_3$:

5. Calculate the number of atoms of each element present in the teaspoon-sized sample of H_2O as follows:

Atoms of H = (_____ mol H) $\left(\frac{6.02 \times 10^{23} \text{ atoms H}}{1 \text{ mol } H_2O}\right)$

Repeat this for the # of atoms of O in H_2O and record in the table above.

6. Repeat Step #5 for the other two compounds in your table.

NaCl:

$CaCO_3$

7. Which of the three teaspoon-sized samples contains the greatest number of moles?

8. Which of the three compounds contains the most atoms?