

NAME:

HONORS CHEMISTRY

SECTION:

Chapter 8 Review Sheet

### Holy Mole(y) Review

After studying chapter 8, you should be able to:

- Calculate the gram formula mass of any given compound.
- Use gram formula mass to convert between mass in grams and amount in moles of a chemical compound.
- Define how Avogadro's number is related to a mole of any substance.
- Calculate the number of molecules, formula units, or ions in a given molar amount of a chemical compound.
- Calculate the percentage composition of a given chemical compound or experimental data.
- Calculate the molarity of a solution (Section 15.4 in textbook)
- Use mass data to calculate the mass percent of a solution. (Section 15.3 in textbook)
- Derive the empirical formula of a compound from experimental data (either a percentage or a mass composition).
- Derive the molecular (true) formula of a compound from experimental data.
- Determine the formulas of hydrates.

#### I. Calculations involving conversions (factor label):

##### **Moles → ? Grams:**

1. If you have 0.253 mole of Cu, how many grams do you have? \_\_\_\_\_

##### **Grams → ? Moles:**

2. If you have 58.2 grams of Ba, how many moles do you have? \_\_\_\_\_

##### **Atoms (molecules) → ? moles**

3. If you have  $2.87 \times 10^{23}$  atoms of Ca, how many moles do you have? \_\_\_\_\_

##### **Moles → ? atoms (molecules)**

4. If you have 0.00730 moles of Li, how many atoms do you have? \_\_\_\_\_

##### **grams → ? atoms (moles)**

5. a) If you have 17.37 g of N<sub>2</sub>, how many molecules of N<sub>2</sub> do you have? \_\_\_\_\_

b) How many **atoms** of nitrogen do you have? \_\_\_\_\_

c) How many moles of nitrogen atoms do you have? \_\_\_\_\_

#### II Calculations involving chemical formulas (not conversions)

##### **Gram-formula masses**

7. Calculate the mass of 1 mole of the following compounds:

a. KMnO<sub>4</sub>

b. Al(NO<sub>2</sub>)<sub>3</sub>

RhCl<sub>3</sub>•3H<sub>2</sub>O

**Formula → ? %**

8. How does the percent by mass of each element present in a compound depend on the mass of the sample?

9. Calculate the % composition for all of the elements in adenosine,  $C_{10}H_{13}N_5O_4$ .

10. Calculate the percent by mass of water in  $VBr_3 \cdot 6H_2O$ . Give the systematic name for the hydrate.

**Determine the Empirical formula (% → ? Formula or g → ? formula)**

11. A student finds out that mystery compound X has 40.0% carbon, 6.7 % hydrogen, and 53.3% oxygen. What is the empirical formula for mystery compound X?

12. 2.3g of magnesium combines with 6.75g of chlorine. What is the empirical formula of the compound formed?

13. An oxide of iron is found to be 70.0% iron by mass. Determine the empirical formula for this compound and name it.

14. A 151.9-mg sample of a new compound has been analyzed and found to contain the following masses of elements: carbon, 82.80 mg; hydrogen, 13.90 mg; oxygen, 55.15 mg. Calculate the empirical formula of this compound.



19. The gfm of the compound in question 18 is found to be around 60 g/mol. Determine the molecular formula of the compound.

### **Molarity**

20. What mass of sucrose,  $C_{12}H_{22}O_{11}$ , is needed to make 300 mL of a 0.50 M solution?

21. What is the molarity of a solution that contains 212.5 g of sodium nitrate in 3.0 L of solution?

### **Percent Solutions**

22. What mass of  $Ca(NO_3)_2$  should be dissolved in sufficient water to make 375 g of 9.55% solution?

23. A pharmacist needs to prepare a medicinal ointment. She mixes 6.8 g of solid D with 57.9 g of an ointment base. What is the percentage of D by mass in the ointment?