Chemistry 111 – 2015 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exam #1 September 24, 2015

NA = 6.022 x 1023

1. How many protons, neutrons and electrons are found in an ion of the isotope 34S2-

\_\_\_ protons \_\_\_ neutrons \_\_\_ electrons

2. Define:

Isotopes:

Allotropes:

3. Elements in the same \_\_\_\_\_\_\_\_\_\_\_ of the periodic table tend to have similar properties.

4. Give formulas for the following:

 ammonium phosphate: boron trichloride:

 disulfur decafluoride: potassium sulfate:

5. Name the following:

 MgCl2 : S2O3 :

 Na2SO3 : AlBr3 :

6. Identify the following compounds as covalent or ionic:

 C2H6 covalent or ionic S2Cl4 covalent or ionic

 Mg(NO3)2 covalent or ionic NH4ClO4 covalent or ionic

7. How many atoms of hydrogen are found in 8.40 mol N2H4? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Balance the following reaction:

 \_\_\_ Al2(SO3)3 + \_\_\_ HCl 🡪 \_\_\_ AlCl3 + \_\_\_ SO2 + \_\_\_ H2O

8. Copper (Cu) has two isotopes. Their masses are:

 63Cu = 62.93 aum 65Cu = 64.93 amu

Which isotope is present in greater abundance? 63Cu or 65Cu

9. Consider the reaction of butane with oxygen:

 2 C4H10 + 13 O2 🡪 8 CO2 + 10 H2O

If 5.6 mol C4H10 are reacted with excess oxygen, what amount (in moles) of H2O can be formed?

10. Why do we use “moles” to describe chemical amounts?

11. What is the molar mass of (NH4)2SO3?

12. Well mixed, filtered salt water represents:

element compound pure substance

 homogeneous mixture heterogeneous mixture

Long Answer Questions: You MUST Show All Work

Some molar masses: MgSO4: 120.36 g/mol Fe2O3: 159.69 g/mol

 Na2SO4: 142.04 g/mol

13. Calculate the percent composition of oxygen in MgSO4.

14. What is the weight of one gallon of gasoline (in pounds)?

Density = 0.72 g/cm3

1 gallon = 3.785 L

1 pound = 454 g

15. A **43.09** gram sample of a hydrate of **Na2SO4** was heated thoroughly in a porcelain crucible, until its weight remained constant. After heating, **22.82** grams of the anhydrous compound remained. What is the formula of the compound?

16. A compound is found to contain **43.64% phosphorus** and **56.35** % **oxygen** by weight. What is the empirical formula?

17. Metallic iron is made by the reaction of iron oxide with carbon:

 2 Fe2O3(s) + 3 C(s) 🡪 4 Fe(s) + 3 CO2(g)

If one pound (454 g) Fe2O3 are reacted with excess C, what mass of CO2 is formed?

18. A compound is found to have the empirical formula C4H5. It’s mass spectrum is below.



a. What is the molecular formula of the compound? \_\_\_\_\_\_\_\_\_\_

b. What leads to the peak labeled “B”? Give a one-sentence general description.

c. What leads to the peak labeled “C”? Describe in one or two sentences. You are looking for the general cause, not the specific chemical entity.

I swear I have cheated in no way during this exam: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_