Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ "Mole Music."

\_\_\_\_\_\_\_1. What is the molar mass of KNO3? Include the correct unit.

\_\_\_\_\_\_\_2. When the equation Fe + Pb(NO3)2 ⭢ Fe(NO3)3 + Pb is balanced, with the lowest possible whole number coefficients, what is the sum of the coefficients?

\_\_\_\_\_\_\_3 The reaction in question 2 is best described as A) single replacement B) double replacement C) synthesis D) decomposition

2 Al(s) + 3 H2SO4(aq) ⭢ Al2(SO4)3 (aq) + 3 H2(g)

Base your answers to questions 4 to 7 on the reaction shown above.

\_\_\_\_\_\_\_\_\_4. What is the molar mass of sulfuric acid? (H2SO4 )

\_\_\_\_\_\_\_\_\_5. How many moles of sulfuric acid are there in 49.0 grams of H2SO4?

\_\_\_\_\_\_\_\_\_6. How many **moles**  of Al are required to react completely with the moles of sulfuric acid you found in question 5 ?

\_\_\_\_\_\_\_\_7 . In this same reaction, how many moles of aluminum metal

are needed to produce 6.0 moles of hydrogen gas?

\_\_\_\_\_\_8. What is the mass, in grams of 0.250 moles of NaOH?

A) 10.0 g B) 40.0 g C) 160. g D) 0.250 g

\_\_\_\_\_\_9. How many moles of KBr are there in 150 grams of KBr?

A) 0.80 B) 1.26 C) 2.50 D) 4.14

\_\_\_\_\_\_10. How many grams of water contain the same number of moles as

11.0 grams of CO2? A) .25 B) 4.5 C) 11 D)

\_\_\_\_\_\_11. What is the % phosphorous, by mass, in P2O5 ? ( MM = 142)

A) 21.8 % B) 43.6 % C) 57.3 % D) 78.2 %

\_\_\_\_\_\_12. A certain hydrocarbon has the empirical formula CH, and a molar mass of 78. The molecular formula for this hydrocarbon is A) CH B) C6H6

C) C5H18 D) C7H7

\_\_\_\_\_\_13. A substance with an empirical formula of CH3 might have a molar mass of

A) 7.5 B) 30 B) 42 C) 57

\_\_\_\_\_\_14. In the reaction 2 H2 + O2 → 2 H2O, in excess oxygen, how many moles of hydrogen are needed to produce 1.0 mole of water?

A) 1.0 B) 0.50 C) 2.0 D) 4.0

\_\_\_\_\_\_15. 0.400 mol of glycerol has a mass of 36.8 grams. What is the molar mass of glycerol? A) 14.7 g B) 147 g C) 92.0 g D) 145 g

\_\_\_\_\_\_16. Equal numbers of moles of different gases at STP have the same volume. Therefore, what is the mass of a sample of SO2 gas that occupies the same volume at STP as 8.00 grams of He gas? (MM of SO2 = 64 g, He=4.0 g)

A) 2.0 g B) 32 g C) 64 g D) 128 g

Part II. Solve the following problems, and show work.

I. Find the % water by mass in the hydrate BaCl2⦁ 2 H2O

II. When iron is heated in chlorine, it reacts as follows: 2 Fe + 3 Cl2 → 2 FeCl3

5.6 grams of iron are heated in excess chlorine.

A. How many moles of iron were heated?

B. How many moles of Cl2 react with the 5.6 grams of Fe?

C. How many **grams** of chlorine reacted with the 5.6 g of Fe?

Extra Credit Page

Two numbers that mean a lot to chemists are 6.02 x 1023 and 22.4 liters.

I. The number, 6.02 x 1023 has a special name. What is that name?

II. 22.4 liters is the volume of one mole of any ideal gas at STP. What is the volume at STP of 1.204 x 1024 molecules of neon gas?

III. What is the mass of 5.60 liters of He gas at STP ?

IV. What is the empirical formula of a substance that, by mass, is

2.44 % hydrogen, 39.0 % sulfur, and 58.54 % oxygen?