Merrily we mole along. Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_1. When the following equation is balanced using the smallest possible whole number

coefficients, what is the sum of the coefficients? Al + H2SO4 ➞ Al2(SO4)3 + H2

A) 4 B) 5 C) 8 D) 9

\_\_\_\_\_2. The reaction above could best be described as A) single replacement

B) double replacement C) synthesis D) decomposition.

\_\_\_\_\_3. When (NH4)2CO3 is heated strongly, a chemical reaction takes place in which

the ammonium carbonate is the only reactant. This reaction is most likely a

A) synthesis B) decomposition C) single replacement D) double replacement

\_\_\_\_\_4. How many moles are there in 9.0 grams if glucose, C6H12O6 ?

A) 0.050 B) 0.50 C) 20 D) 9.0

\_\_\_\_\_5. What is the mass of 0.60 moles of water? A) 30 g B) 11 g C) 3.0 g D) 18 g

\_\_\_\_\_6. Which of the following substances has the greatest % of sulfur, by mass?

A) H2S B) SO2 C) Sn(SO4)2 D) SeS3

\_\_\_\_\_7. A hydrocarbon that has the empirical formula CH, and a molar mass of 78 grams

would have the formula A) C4H4 B) C5H18 C) C6H6 D) C7H7

\_\_\_\_\_8. The reaction Cu + 4 HNO3 ➞ Cu(NO3)2 + 2 H2O + 2 NO2 can be used to produce

NO2 gas. How many moles of Cu must be used to produce 5.0 moles of NO2 ?

A) 1.0 mole B) 2.0 mole C) 2.5 mole D) 10. mole

\_\_\_\_\_9. An aqueous solution with a mass of 4,000 grams is found to contain 2.00 gram of

calcium ion. What is the concentation of Ca2+ in parts per million?

A) 50.0 ppm B) 500. ppm C) 2000. ppm D) 8000. ppm

\_\_\_\_\_10. What is the **% Ca2+** in the solution in question 9? A) 0.500 % B) 5.00 %

C) 0.0200 % D) 0.0500%

\_\_\_\_\_11. What is the molarity of a solution containing 0.50 mol of sugar in 0.20 L of solution?

A) 0.10 M B) 2.5 M C) 0.40 M D) 180 M

\_\_\_\_\_12. How many grams of NaOH (MM=40 g) must be dissolved in 400. mL of solution

to produce a 2.00 molar solution of NaOH? A) 0.80 g B) 32 g C) 0.20 g

D) 20.0 g

\_\_\_\_\_13. 80.0 grams of NaOH is used to produce a 0.20 molar solution. What must be the

volume of the solution? A) 0.10 L B) 10. L C) 16 L D) 1.6 L

\_\_\_\_\_14. Molarity, % by mass, and parts per million are all units of

A) volume B) mass C) density D) concentration

\_\_\_\_\_15. 14.0 grams of pentene is equal to 0.200 moles of pentene. What is the molar mass of

pentene? A) 2.80g B) 7.00 g C) 70.0 g D) 28.0 g

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_16 (fill in) What is the **empirical formula** of sodium oxalate? .

\_\_\_\_\_\_17. A solution of NaCl in water can be separated through a process called

A) distillation B )filtration C) chromatography D) hararization

\_\_\_\_\_\_18. The addition of 90.0 grams of a certain solid to 100. g of water produces a saturated

solution, with 2.0 grams remaining undissolved. If the temperature is 20.0̊C, the solid

might be (see table G) A) KI B) KNO3 C) NaNO3 D) HCl

\_\_\_\_\_\_19. The largest **decrease** in solubility, between 10̊ and 40̊, in grams per 100 g of water,

is shown by A) NH3 B) HCl C) NaNO3 D) KNO3

\_\_\_\_\_\_20 How many grams of KI are needed to exactly saturate 50.0 grams of water at 15̊?

A) 50 g B) 70 g C) 140 g D) 280 g

\_\_\_\_\_\_21. Which of the following solutes is likely to be most soluble in CCl4 ?

A) I2 B) NH3 C) H2O D) NaCl

\_\_\_\_\_\_22. In the expression “Like dissolves like,” the term “like” refers to

A) the molar masses of the solute and solvent B) the colors of the solute and solvent

C) the bonding forces in the solute and solvent D) the boiling points of the solute and

solvent.

\_\_\_\_\_\_23. Oxygen gas is most soluble in water under conditions of

A) low temperature and high pressure B) high temperature and high pressure

C) high temperature and low pressure D) low temperature and low pressure

\_\_\_\_\_\_24. 110 grams of NaNO3 are dissolved in 100 g of water at a temperature of

60.̊C. The temperature is slowly cooled until crystals begin to form. We would expect

crystals to begin to form as the temperature cools beyond A) 40̊ B) 35.̊

C) 45̊ D) 30̊

\_\_\_\_\_25. One small crystal is added to a solution of NaC2H3O2, and the result is that a great many additional crystals form. The solution of NaC2H3O2, before the crystal was added,

was A) supersaturated B) saturated C) unsaturated D) green

\_\_\_\_\_26. As NaCl is added to an aqueous solution, the boiling point of the solution

A) increases, and the freezing point decreases

B) decreases, and the freezing point increases

C) decreases, and the freezing point decreases

D) increases, and the freezing point increases

\_\_\_\_27. Based on table F, which of these compounds is least soluble in water?

A) Na CO3 B) PbI2 C) CuSO4 D) Ba(OH)2

\_\_\_\_\_28. When Ba(NO3)2 solution is mixed with a solution of Na3PO4, a precipitate forms.

The formula for this precipitate is A) NaNO3 B) Na3(NO3)2 C) BaPO4

D) Ba3(PO4)2

PROBLEMS: Show work to get part credit .

I. Oxygen is often produced through the decomposition of KClO3 :

KClO3 ➞ KCl + O2

A. Balance the equation.

B. What is the molar mass of KClO3 ? (round to nearest whole number)

C. 24.6 grams of KClO3 are heated.

i. How many moles of KClO3 are heated?

ii. How many moles of O2 are produced from that much KClO3?

iii. What is the mass of the oxygen produced?

II. In an experiment, 5.00 grams of the hydrate CuSO4∙5 H2O is heated until all of the water has been driven out. The new mass of dry CuSO4 is 3.00 grams.

A. What is the % of **water** in the hydrate, based on the data in this experiment?

B. What is the % of water in the hydrate, based on the formula, CuSO4∙5H2O ?

( The molar mass of CuSO4∙5H2O is 250 g )

C. Based on your answers to parts A and B, what is the % error in the experiment?

Extra Credit Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ You may also use part of this page to show work if you run out of room on the test.

I. If 6.54 grams of Zn is placed in a solution containing 3.65 grams of HCl, it reacts

Zn + HCl ➞ ZnCl2 + H2 (not balanced)

a) When the reaction reaches completion, one of the reactants will still be there. Which one? Explain how you know.

b) How many grams of hydrogen would be produced?

II. What is the empirical formula of a substance that is 34.6 % Al, 3.85 % H, and

61.5 % O ? ( Show work)