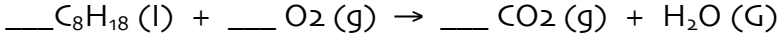
2014 STOICH/RXNS/EMPIRICAL FORMULA REVIEW PRACTICE TEST

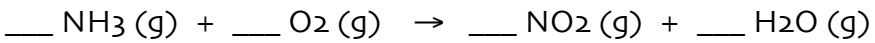
_____ 1. When the following equation is balanced, what are the appropriate coefficients in the equation?



___C_8H_{18} (l) + ___ O2 (g) → ___ CO2 (g) + H_2O (G)

_____ 2. The molecular weight of caffeine, ($C_8H_{10}N_4O_2$), is_____ amu.

_____ 3. When the following equation is balanced, the coefficients are_____.



___ NH3 (g) + ___ O2 (g) → ___ NO2 (g) + ___ H2O (g)

_____ 4. Which one(s) of the following do(es) ***not*** occur as diatomic molecules in elemental form?

Sulfur, nitrogen, hydrogen, bromine, oxygen, iron, carbon

_____ 5. In a chemical reaction the limiting reagent will be the substance _____.

_____ 6. In addition to atoms, the only quantity conserved (is equal on both sides of an equation) in every chemical reaction is _____.

_____ 7. The ____ in a balanced equation reveals the mole ratios of the substances involved.

_____ 8. In using balanced equations to solve mass-mass problems, the mass of each reactant is first converted to _____.

_____ 9. What is the volume of a mole of a gas at standard temperature and pressure (STP)?

_____ 10. In mass-mass problems, the steps to follow are best summarized as going from _____.

_____ 11. The excess reactant in a completed chemical reaction will be the substance _____.

_____ 12. What step is the first to complete in every single stoichiometric problem?

_____13. Considering the following balanced equation:

CaC_2 (s) + $2H_2O$ (l) → $Ca(OH)_2$ (aq) + C_2H_2 (g)

If 2.45 moles of CaC_2 are added to water, how many liters of C_2H_2 will form at STP?

Stoichiometry calculations: *You must use dimensional analysis and show all of your work!*

Questions 14 & 15 will refer to the following *unbalanced* equation.

$$\_\_\_ C_5H_{12} (g) + \_\_\_ O_2 (g) \rightarrow \_\_\_ CO_2 (g) + \_\_\_ H_2O (g)$$

14. If 32.15 grams of C_5H_{12} were burned with unlimited O_2, how many moles of H_2O would form?

15. If 65.7 L of O2 were burned with excess C_5H_{12}, how many grams of CO2 would form?

Questions 16 & 17 will be based on the following *balanced* equation:

$$\_\_\_\_ C_2H_6 (g) + \_\_\_\_ O_2 (g) \rightarrow \_\_\_\_ CO_2 (g) + \_\_\_\_ H_2O (l)$$

16. If 12.06 grams of C_2H_6 were burned with 96.5 grams of O_2.
What is the limiting reagent?

17. How many molecules of CO_2 will be formed when the reaction in question 16 takes place?

% Composition, Empirical and Molecular Formula Problems.

18. The following percentages are based on mass. The chemical aspirin, acetylsalicylic acid, contains 59.99% Carbon, 4.48% Hydrogen, and 35.52% Oxygen. A) What is the empirical formula of this compound?

B) If the molar mass of this compound is 180.17 g/mol, what is the molecular formula?

19. What is the percent composition of the elements in iron(III)oxalate, $Fe_2(C_2O_4)_3$?

Reaction families and Descriptive Chemistry

For questions 20-27, first predict the products and then balance the equation.

20. Solid calcium metal is strongly heated in oxygen gas.

21. What reaction family is taking place in question 20? _____

22. An aqueous solution of potassium peroxide (O_2^{2-}) is decomposed.

23. What reaction family is taking place in question 22? _____

24. A piece of solid magnesium metal is placed in a beaker of aqueous hydrochloric acid.

25. What reaction family is taking place in question 24? _____

26. Liquid nonane (C_9H_{20}) is burned in the presence of oxygen gas.

27. What reaction family is taking place in question 26? _____