Name: _____

Unit 4 Study Guide (Chapter 10, 11, and 12)

Chapter 10:*Study all vocabulary for Chapter 10!**

1. Calculate the molar mass for the following.
   a. sodium chromate
   b. sulfuric acid
   c. lead (IV) chloride
2. Convert 3.98 moles of iron (II) chloride to grams.
3. Convert 6.39×10^{25} molecules of copper (II) phosphate to moles.
4. Convert 378.7 liters of oxygen to moles.
5. What is the empirical formula for the following?
   a. $C_3H_9N_3$ b. P_4O_{10} c. $C_{12}H_{22}O_{11}$
6. What is the empirical formula of a compound that contains 62.1%C, 13.8%H, and 24.1%N?
7. Calculate the percent composition of the compound that forms when 222.6g N combines completely with 77.4g O.
8. Calculate the percent composition of ammonium nitrate.
9. What is the molecular formula of a compound with a molar mass of 150g/mol and an empirical formula of CH_2O?
10. What is the empirical formula for a compound made of 50.7%C, 4.2%H, and 45.1%O?

Chapter 11:*Study all vocabulary for Chapter 11!**

Balance the following equations.

11. ___ $C_7H_6O_2$ + ___ O_2 □ ___ CO_2 + ___ H_2O
12. ___ Na_2O_2 + ___ H_2O □ ___ NaOH + ___ O_2
13. ___ $Ca(ClO_3)_2$ □ ___ $CaCl_2$ + ___ O_2
14. ___ C_4H_{10} + ___ O_2 □ ___ CO_2 + ___ H_2O
15. ___ $HClO_4$ + ___ P_4O_{10} □ ___ H_3PO_4 + ___ Cl_2O_7
16. ___ C_2H_5OH + ___ O_2 □ ___ CO_2 + ___ H_2O
17. ___ $BaCl_2$ + ___ $Al_2(SO_4)_3$ □ ___ $BaSO_4$ + ___ $AlCl_3$

Predict the products and classify the type of the following reactions.

18. $C_3H_8 + O_2$ □

19. $Al + Br_2$ □

20. $Fe + CuSO_4$ □ (Hint: Fe has a +2 charge.)

21. $NaCl$ □

22. $NaCN + H_2SO_4$ □

Chapter 12:*Study all vocabulary for Chapter 12!**

23. Given the following equation:

$2\ KClO_3$ □ $2\ KCl + 3\ O_2$

How many moles of oxygen can be produced by letting 12.00 moles of potassium chlorate react?

24. Given the following equation:

$Na_2O + H_2O$ □ $2\ NaOH$

How many grams of sodium oxide are required to produce 1.60×10^{21} molecules of sodium hydroxide?

25. Given the following equation:

___ Fe_2O_3 + ___ C □ ___ Fe + ___ CO

If 0.156 mol of pure Fe_2O_3 is used, how many atoms of iron can be produced? (Hint: Balance the reaction first!)

26. Given the following equation:

___ $C_6H_{12}O_6$ + ___ O_2 □ ___ CO_2 + ___ H_2O

If 120 grams of glucose are used, then how many liters of water are produced? (Hint: Balance the reaction first!)

27. Given the following equation:

$Cu + 2\ AgNO_3$ □ $Cu(NO_3)_2 + 2\ Ag$

If 1.12 mol of copper and 1.1 mol of silver (I) nitrate react, then how many moles of copper (II) nitrate will be produced? Identify the limiting and excess reagents.

28. Given the following equation:

$8\ Fe + S_8$ □ $8\ FeS$

If 150 grams of iron react with 150 grams of sulfur, then how many grams of iron (II) sulfide are produced?

29. Given the following equation:

$$Na_2CO_3 + 2\ HNO_3 \rightarrow 2\ NaNO_3 + H_2O + CO_2$$

If 30 grams of sodium carbonate react to form 0.54 mol of sodium nitrate, then what is the percent yield?

30. Given the following equation:

$$4Fe + 3O_2 \rightarrow 2Fe_2O_3$$

If 1.79 mol of iron react with 2.81 mol of oxygen and 0.812 mol of iron(III)oxide is produced, then what is the percent yield? Identify the limiting and excess reagents.