Honors Chemistry Name_____ Date _____ Per __

Semester 1 Review 2011-2012

Place answers on a separate paper. This review must be turned in to the proctor on the day of the exam to receive credit.

1. Define: Element, compound and mixture.

2. Differentiate between a chemical versus physical change.

3. The density of propylene glycol, a substance used as a nontoxic antifreeze, is 1.040 g/mL at 20°C. What is the density of this substance at 20°C expressed in units of a) pounds per gallon and b) grams per liter? (1kg ≈ 2.205lbs, 1gallon = 3.7854 L)

4. A standard compact disc has a diameter of 4.72 in. If the disc is spinning at 530 rpm (revolutions per minute), how fast is a point on the edge of the disc moving, expressed in miles per hour? ($C = \pi D$; 1mi = 5280ft)

5. Differentiate between accuracy and precision. A student measures the density of a material three times with values of 3.13g/mL, 3.15g/mL and 3.12g/mL. She finds in a chemistry reference book that the accepted density for the material is 3.75g/mL. Comment on the accuracy and precision of these measurements.

6. Write the formulas for the following compounds: a) iron(III)oxide, b) stannic sulfide, c) tetraarsenic decaoxide, d) sulfuric acid, e) cupric sulfate

7. Name the following compounds: a) $BaSO_4$, b) I_4O_9, c) K_3PO_4, d) $NH_4C_2H_3O_2$, e) $Fe_2(CO_3)_3$

8. Naturally occurring bromine is composed of ^{79}Br (78.9183amu) and ^{81}Br (80.9163amu). Use this information and the average atomic mass of bromine given on the periodic table to calculate the relative abundances of these two isotopes.

9. Elements X and Y form the compound XY_4. When these elements react, it is found that 1.00g of X combines with 5.07g of Y. When X combines with oxygen, it forms the compound XO_2 in which 1.00g of X combines with 1.14g of O.
   a) What is the atomic mass of X?
   b) What is the atomic mass of Y?

10. How many grams of carbon are there in a) 0.200 mol of Na_2CO_3 and b) 25.0g of C_6H_{14}?

11. An artificial fruit beverage contains 12.0g of tartaric acid, $H_2C_4H_4O_6$ (MM=150.09g/mol), to achieve tartness. It is titrated with a basic solution that has a density of 1.045g/cm^3 and contains 5.00% (by mass) KOH. What volume (in mL) of the basic solution is required? (One mole of tartaric acid reacts with two moles of hydroxide ion.)

12. Silver nitrate, $AgNO_3$, reacts with iron(III)chloride, $FeCl_3$, to give silver chloride, AgCl, and iron (III) nitrate, $Fe(NO_3)_3$. A solution containing 18.0g of $AgNO_3$ was mixed with a solution containing 32.4g of $FeCl_3$. a) Write the equation for this reaction. b) Which reactant is the limiting reactant? c) What is the maximum number of moles of AgCl obtainable from this experiment? d) What is the maximum number of grams of AgCl obtainable from the experiment? e) How many grams of the excess reactant remain after the reaction is over?

13. Calculate the percent composition of oxygen in copper(I)oxide.

14. Concentrated aqueous ammonia contains 26g NH_3 per 100mL of solution. What is its molarity?

15. Calcium phosphate, $Ca_3(PO_4)_2$, forms as a precipitate when aqueous solutions of sodium phosphate, Na_3PO_4, and calcium nitrate, $Ca(NO_3)_2$, are mixed. (The other product, which remains dissolved, is sodium nitrate.)

a. Write a balanced equation for this reaction.

b. What volume (in mL) of 0.328M Na_3PO_4 will react exactly with 48.4mL of 0.212M $Ca(NO_3)_2$ to produce these products?

16. What is the final molarity of a solution in which 250mL of .0025M HCl is combined with 600mL of .0035M HCl? What is the molarity of a 25mL sample of this final solution?

17. Identify the following reaction types:

a. Methane (CH_4) reacts with oxygen.

b. Magnesium metal reacts with silver nitrate solution.

c. Aqueous silver nitrate reacts with aqueous potassium chloride.

d. Aqueous hydrogen chloride reacts with a solution of lithium hydroxide.

18. In an acid-base neutralization reaction the salt that is formed is rubidium permanganate. What are the identities of the original acid and base?

19. Identify the precipitate and spectator ions when aqueous solutions of copper(II)sulfate and barium chloride are mixed.

20. What is the oxidation number for sulfur in the compound potassium sulfate?

21. What element is reduced in the following reaction (write oxidation numbers over the top of each element as proof of your answer)? $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

22. Balance the following reaction that takes place in acidic medium. $SeO_3^{2-} + I^- \rightarrow Se + I_2$

23. A strip of magnesium metal is placed in 50.0mL of .250M silver nitrate solution. Assuming a reaction occurs:

a. Write a balanced molecular equation for the reaction.

b. Write a balanced net ionic equation for the reaction.

c. If the reaction goes to completion, how many grams of the element that begins with an oxidation number of 0 is used in the reaction (be sure to identify the element this refers to)?

d. Which metal is more “active”, magnesium or silver? Explain based on this reaction.

24. How many grams of sodium chloride are contained in a 45.5mL sample of a solution that is .300M? If the 45.5mL sample is diluted with water to 200.mL, what is the molarity of the resulting solution?

25. Using the terms element, compound, molecule, homogeneous mixture and heterogeneous mixture identify the following:

a. Beach sand

b. Br_2

c. KCl

d. Vinegar

e. CO_2

f. PCl_3