**CHM 1045 (12:20 pm Lecture)** **HOUR TEST 1** **Name _____**
**September 20, 2002** **(please print)**

**Recitation: Section _____ Meeting Time_____**

This exam consists of 4 pages. Make sure you have one of each. Print your name at the top of each page now. A fifth page contains a periodic chart. You may tear it off and use it as a scratch sheet. Show your work on calculations, including unit conversions, and give answers in the correct units and appropriate number of significant figures.

**In problems involving molecular and formula weights, you may use values rounded to the nearest 0.1 amu.**

If anything confuses you or is not clear, raise your hand and ask!

| Page | Points |
|---|---|
| 1 | _____ |
| 2 | _____ |
| 3 | _____ |
| 4 | _____ |
| **Total** | _____ |

(2) 1. Copper has a density of 8.92 g/cm$^3$. What is the volume of a copper nugget that has a mass of 25.1 g?

(4) 2. You bought a new automobile which gets a gas mileage of 35 miles/gallon. Your European friend wants to know what this is in kilometers per liter. What do you tell him?
(1 mile = 1.609 kilometers; 1 gallon = 3.785 liters)

(8) 3. Name the following compounds:

$Cu(OH)_2$ _____ $(NH_4)_2S$ _____

$Na_2CO_3$ _____ $K_2SO_3$ _____

(8) 4. Write the formulas for the following:

strontium chloride _____ dinitrogen pentoxide _____

iron (II) chlorite _____ magnesium bromate _____

(9) 5. Give the number of protons, neutrons, and electrons in the following:

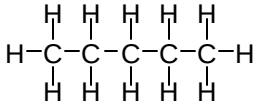
| Nuclide | Protons | Neutrons | Electrons |
|---|---|---|---|
| $^{96}Mo$ | _____ | _____ | _____ |
| $^{32}S^{-2}$ | _____ | _____ | _____ |
| $^{70}Ga^{+3}$ | _____ | _____ | _____ |

(8) 6. Give the atomic symbol, as in the illustration, including **Z**, **A**, and **q** for atoms or ions containing the following numbers of particle:

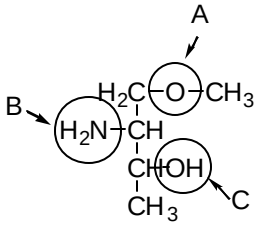
(a) 15 p, 16 n, 18 e (b) 38 p, 49 n, 36 e

$${}^{A}_{Z}X^{q}$$

(8) 7. Give the molecular formula and name for the following hydrocarbons.

| **Structural Formula** | **Molecular Formula** | **Name** |
|---|---|---|
|  | | |
| $CH_3CH_2CH_2CH_2CH_2CH_2CH_2CH_3$ | | |

(6) 8. For the following organic compound, give the **name** of the circled organic functional groups.




A. _____

B. _____

C. _____

(14) 9. Balance the following chemical equations (reduce to the smallest whole number coefficients; if coefficient is 1, you need not enter anything):

(a) ____$La_2O_3$ + ____$H_2O$ → ____$La(OH)_3$

(b) ____Al + ____HCl → ____$AlCl_3$ + ____$H_2$

(c) ____$Fe(OH)_3$ + ____$H_2SO_4$ → ____$Fe_2(SO_4)_3$ + ____$H_2O$

(d) ____CO + _____$O_2$ → _____$CO_2$

(4) 10. Calculate the number of molecules in 23.1 g of $CO_2$.

(8) 11. A compound containing only carbon, hydrogen and oxygen was shown by combustion analysis to consist of 77.78% C and 7.41% H. What is its empirical formula?

(6) 12. You place 2.55 g of NaOH into a 500 mL volumetric flask, and fill the flask with water.

(a) What is the M (i.e., molarity) of the solution?

(b) You need 0.0155 moles of NaOH for a reaction. What volume of this solution would you measure?

(15) 12. Balance the following chemical equation:

____$Zr(NO_3)_4$ + ____NaCl -----> ____$ZrCl_4$ + ____$NaNO_3$

98.5 g of $Zr(NO_3)_4$ are mixed with 35.5 g of NaCl, and the above reaction proceeds. Answer each of the following questions in the blank provided, **showing your work in the space under the question**.

(a) How many moles of $Zr(NO_3)_4$ is this? _____

(b) How many moles of NaCl is this? _____

(c) Which is the limiting reagent? _____

(d) How many g of $ZrCl_4$ will be produced? _____

(e) How many g of the excess reagent will be left? _____