# Chemistry 121
# Fall 2004
# Test 1, FORM A

Name: KEY

Instructions: You have 50 minutes to complete this 100-point exam. You may use a simple scientific calculator. No programmable calculators allowed.

1 in = 2.54 cm  1000g = 1kg  1000 mg = 1 g

**I. MULTIPLE CHOICE:** (25 pts, 5 points each) Carefully and clearly circle the best answer. If you circle two answers, *one of which is correct*, you will receive 3 points.

1. The mass number of an atom is indicated by:
   a. The number of protons
   b. The number of electrons
   c. The number of neutrons
   d. The number of protons + electrons
   e. The number of protons + neutrons

   E

2. The chemical formula for a compound containing 3 oxygen atoms, 5 hydrogen atoms, 4 carbon atoms and 1 fluorine atom is:
   a. $O_3H_5C_4F$
   b. $C_4FH_5O_3$
   c. $C_4H_5FO_3$
   d. $C_4H_5O_3F$
   e. None of the above

   C

3. The number of significant figures in 0.0059420 is:
   a. 4
   b. 5
   c. 6
   d. 7
   e. None of the above

   B

4. Elements in Group 1A of the periodic table are called:
   a. Nonmetals
   b. Halogens
   c. Alkaloids
   d. Alkaline Earth Metals
   e. Alkali Metals

   E

5. A temperature of 303 K is _____ °C.
   a. 30
   b. 273
   c. 576
   d. 303
   e. None of the above.

   A

**II. Short Answer and Calculations** (85 pts): Clearly indicate your answer in the space provided. Partial credit will be given for correct work. If I cannot read the work, it will not be graded.

1. (10 pts) Write the chemical formulas for the following compounds:
   a. Barium sulfate $BaSO_4$
   b. Sulfur tetrafluoride $SF_4$
   c. Iron (II) oxide $FeO$
   d. Potassium nitrate $KNO_3$
   e. Lithium hydroxide $LiOH$

2. (10 pts) Write the chemical name for the following compounds:
   a. $CS_2$ carbon disulfide
   b. $Na_3PO_4$ sodium phosphate
   c. $Al_2O_3$ aluminum oxide
   d. $(NH_4)_2CO_3$ ammonium carbonate
   e. $NCl_3$ nitrogen trichloride

3. (5 pts) An element on the periodic table has 26 protons and a mass number of 56.
   a. What is the name of this element?

      Iron

   b. Write the correct atomic notation.

      $^{56}_{26}Fe$

4. (20 pts) Vitamin E is an acid whose chemical formula is: $C_{29}H_{50}O_2$.
   a. What is the molar mass of Vitamin E? (show all work!)

      29 C = 29(12.01) = 348.29
      50 H = 50(1.008) = 50.40
      2 O = 2(16.00) = 32.00
      430.69 g/mol

   b. What is the percent composition of hydrogen in Vitamin E? (show all work!)

      $\frac{50.40}{430.69} \times 100 = 11.70\%$

5. (10 pts) The density of silver is 10.50 g/mL. What is the volume of a silver necklace that weighs 1.25 g?

$$1.25\text{g} \times \frac{1\text{mL}}{10.50\text{g}} = 0.119\text{ mL}$$

6. (15 pts) Millikenium, with element symbol Mi, originates on planet Oil Drop. Millikenium has 2 isotopes: $^{35}$Mi with a mass of 34.9567 g/mol and $^{39}$Mi with a mass of 39.0095 g/mol. The molar mass of millikenium is 35.9826 g/mol. What are the percent abundances of both of the isotopes?

$^{35}$Mi $34.9569(x) = 34.9569x$

$^{39}$Mi $39.0095(1-x) = \dfrac{39.0095 - 39.0095x}{35.9826\text{ g/mol}}$

$34.9569x + 39.0095 - 39.0095x = 35.9826$

$-4.0526x = -3.0269$

$x = 0.7469$

$^{35}$Mi = 74.69% $^{39}$Mi = 100 − 74.69 = 25.31%

7. (15 pts) How many molecules of Vitamin E are in a 500 mg Vitamin E tablet? You will need to use the molar mass you determined in 11a.

$$500\text{mg} \times \frac{1\text{ g}}{1000\text{mg}} \times \frac{1\text{ mol Vit E}}{430.69\text{g Vit E}} \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}}$$

$= 6.99 \times 10^{20}$ molecules Vitamin E