

Name: KEY

Test 1
Chem 121
Spring 2009
Form A

You must complete **PART I** of this test without your calculator. When you are ready to start **PART II** (calculations), put the first page on the floor by your feet. You may not return to **PART I**. Staple and turn in both sections when finished.

PART I: You may **NOT** use a calculator for this section.

1. (3 pts) Circle the correct property

Snow melts when the day warms.	Physical	Chemical
Lithium metal burns in oxygen.	Physical	Chemical
Unprotect metal rusts when it rains.	Physical	Chemical

2. (6 pts) Indicate the number of significant figures (SF) and write the number in scientific notation

	Number of SF	Scientific Notation
a. 0.0530	<u>3</u>	<u>5.30×10^{-2}</u>
b. 25000	<u>2</u>	<u>2.5×10^4</u>
c. 26.090	<u>5</u>	<u>2.6090×10^1</u>

3. (5 pts) Fill-in the blank with the appropriate word.

- The Greek word "atomos" means uncuttable.
- The particles in the nucleus of atoms are referred to as nucleons.
- Elements that have the same number of protons, but different number of neutrons are called isotopes.
- Atoms that fall into the A groups of the periodic table are referred to as the Main Group Elements.
- Reactants are consumed in a chemical reaction.

4. (12 pts, 3 pts each) Fill-in the blanks

Element Name	Symbol	Number of Protons	Number of Neutrons	Mass Number
ytrium	Y	39	50	89
iron	Fe	26	31	57
krypton	Kr	36	48	84
gold	Au	79	119	198

5. (12 pts, 2 pts each) Name the following compounds

a. BaSO_4 barium sulfate

b. N_2S_4 dinitrogen tetrasulfide

c. TiO_2 titanium (iv) oxide

d. SeI_5

selenium pentaiodide

e. $\text{Co}(\text{C}_2\text{H}_3\text{O}_2)_2$

cobalt(II) acetate

f. OF_2

oxygen difluoride

6. (12 pts, 2 pts each) Give the chemical formula of the following compounds

a. zinc(I) nitrate dihydrate $\text{ZnNO}_3 \cdot 2\text{H}_2\text{O}$

b. bromine monochloride BrCl

c. potassium sulfate K_2SO_4

d. tetracarbon disulfide C_4S_2

e. sodium dichromate $\text{Na}_2\text{Cr}_2\text{O}_7$

f. phosphorus tetrachloride PCl_4

7. (10 pts) In 4 – 5 grammatically correct sentences, answer one of the following essay questions.

a. Explain how a piece of thin metal foil was used in the discovery of the atomic nucleus.

b. Describe the apparatus that Millikan built to determine the charge on an electron.

See Facets of
Chemistry in Chapter 2

When you are done with Part I, please put it on the floor and continue to Part II. You may not return to Part I.

PART II: Once you start this section, you may not return to PART I. You may now use your calculator to complete the rest of the exam. **Show all work for credit.**

1. (15 pts) An unknown element has three isotopes of mass and percent abundance listed below. What is the average atomic mass of this element?

isotope #1: 27.97693 u, 92.23%

isotope #2: 28.9765 u, 4.683%

isotope #3: 29.97377 u, 3.087%

$$\begin{aligned}(27.97693 \text{ u})(0.9223) &= 25.804 \\ (28.9765 \text{ u})(0.04683) &= 1.357 \text{ u} \\ (29.97377 \text{ u})(0.03087) &= 0.9253 \text{ u} \\ \hline &28.086 \text{ u}\end{aligned}$$

Write the name of this element (not symbol) on the line below. (Hint: use the periodic table)

silicon

2. (15 pts) The density of bone (according to *Physics of the Body*, Second Edition, 1999) is $1.900 \times 10^3 \text{ kg/m}^3$. If the average skeleton weighs 24.5 lb how much volume is this in mL? ($1 \text{ m}^3 = 10^6 \text{ mL}$, $1 \text{ lb} = 453.59 \text{ g}$)

$$\begin{aligned}24.5 \text{ lb} \times \frac{453.59 \text{ g}}{1 \text{ lb}} \times \frac{1 \text{ kg}}{1000 \text{ g}} \times \frac{\text{m}^3}{1.900 \times 10^3 \text{ kg}} \times \frac{10^6 \text{ mL}}{1 \text{ m}^3} \\ = 5.85 \times 10^3 \text{ mL}\end{aligned}$$

3. (10 pts) On Saturday, the Lady Mocs take on conference rivals, UNC-Greensboro. The distance between McKenzie Arena and Fleming Gymnasium (in Greensboro, NC) is 398.2 mi. How far will the team have to travel in micrometers? (1 mi = 1.609 km)

$$398.2 \text{ mi} \times \frac{1.609 \text{ km}}{1 \text{ mi}} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{10^6 \mu\text{m}}{1 \text{ m}}$$
$$= 6.407 \times 10^{11} \mu\text{m}$$

4. (10 pts) A can of diet coke has a volume of 355 mL. What is this in liquid oz? (1 gal = 3.785 L, 1 gal = 4 qt, 1 qt = 32 liq. oz)

$$355 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{1 \text{ gal}}{3.785 \text{ L}} \times \frac{4 \text{ qt}}{1 \text{ gal}} \times \frac{32 \text{ liq. oz.}}{1 \text{ qt}}$$
$$= 12.0 \text{ liq. oz.}$$