Bellevue Community College  
Chem 101  
Unit 1 Exam  
January 20, 2005  
Good luck!

Circle one:  
Section A (Tues Lab)  
Section B (Wed Lab)  
Section E (Mon Lab)

Early chemists describe the first dirt molecule.
I. (20 points) Choose ONE answer only. Ambiguous markings will be considered incorrect responses, so please be as clear as possible.

1. _____ Which of the following is an element?
   a. LiCl  
   b. Co  
   c. CaH  
   d. HF

2. _____ Which of the following determines the identity of an element?
   a. number of protons  
   b. number of neutrons  
   c. atomic mass  
   d. mass number

3. _____ Which of the following is a heterogeneous mixture?
   a. Water and dissolved sugar  
   b. Water and sand  
   c. Air  
   d. Cough syrup

4. _____ Group VIIA (also called 17) elements are called
   a. alkali metals  
   b. halogens  
   c. transition metals  
   d. noble gases

5. _____ Which of the following elements do you expect to be most like magnesium?
   a. potassium  
   b. silver  
   c. bromine  
   d. calcium

6. _____ True or false. An atom of any element contains the same number of electrons as protons.

7. _____ True or false. A compound must contain at least two elements.

8. _____ True or false. Only elements can exist as pure substances.

9. _____ True or false. A scientific theory is proven and does not change over time.

10. _____ True or false. Most elements on the periodic table are metals.
II. (10 points) Fill in the blank with the letter that corresponds to the correct description.

_____Atomic mass  
____Mass number  
_____Ion  
_____Compound  
_____Nucleus  
_____Alkaline earth metals  
_____Electrons  
_____Isotopes  
_____Atomic mass unit (amu)  
_____Transition metals

III. (10 points) Identify the following as a chemical or physical description

(circle one)

a. Ice is melted into liquid water. Chemical Physical
b. Sugar is crushed into a powder Chemical Physical
c. Methane is a gas at room temperature Chemical Physical
d. Bleach breaks down stains in clothing Chemical Physical
e. Chlorine is a yellowish/greenish gas Chemical Physical
f. Chemicals in a car air bag produce a gas that inflates the bag upon impact Chemical Physical
g. Marshmallows turn black in a fire Chemical Physical
h. Aluminum foil is cut into squares Chemical Physical
i. The boiling point of water is 100ºC Chemical Physical
j. Baking soda and vinegar bubbles Chemical Physical
IV. (30 points) Given names of compounds, provide the chemical formula. Given the following chemical formulas, provide the appropriate name.

You may use the periodic table and list of polyatomic ions provided.

- iron (II) nitrate ________ BF$_3$ ________
- magnesium chloride ________ Cu(NO$_3$)$_2$ ________
- hydrobromic acid ________ OF$_2$ ________
- barium sulfate ________ HCl$_{aq}$ ________
- nitrogen monoxide ________ NH$_4$Cl ________
- lead (IV) chloride ________ K$_2$O ________
- chlorous acid ________ SnO ________
- copper (II) oxide ________ ZnCO$_3$ ________
- chromium (III) acetate ________ H$_2$CO$_3$ ________
- sodium bicarbonate ________ Ag$_2$O ________

V. (10 points) Fill in the 8 missing blanks in the table below (1 point for each box on right; 2 points for each missing isotope symbol.

<table>
<thead>
<tr>
<th>Isotope</th>
<th># of protons</th>
<th># of neutrons</th>
<th># of electrons</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{31}_{15}$P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$^{58}_{28}$Ni$^{2+}$</td>
<td></td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>
VI. (10 points) Atomic theory

(3 points) In the 1800s, who outlined an atomic theory that stated all matter is made up of atoms? __________________

(3 points) Who proved that the plum pudding model was incorrect? ________________

(4 points) What two features of the atomic structure did the gold foil experiment prove?
1. ____________________________________________________
2. ____________________________________________________

VII. Isotopes (10 points)

a. (2 points) What is the atomic mass of lithium? ________________

b. (2 points) There are two isotopes of lithium: lithium-6 and lithium-7. Which is more abundant in nature? ________________

c. (2 points) Will there be any lithium atoms that weigh the same as the atomic mass given in Part a above -- yes or no?

d. (4 points) Atomic masses are calculated by weighted averages. Use this concept to solve the following:

In a collection of marbles, 25% of the marbles have a mass of 5.00 g each and 75% of the marbles have a mass of 7.00 g each. What is the average mass of a marble? Show your calculation below for full credit.