Chem 1314 Section 2 and 3
InClass Exercise #1
Fall 2000

Name_____

TA Name _____

Lab Section #_____

ALL work must be shown to receive full credit. **Due at the end of laboratory.**

ICE1.1. Provide brief definitions for each of the following terms;

a) atom **Atoms are the smallest particles of an element that retain the chemical properties of the element.**	b) molecule **Molecules are units of matter consisting of two or more atoms combined in a definite ratio.**
c) element **An element is a pure substance (an example of matter) which consists of only one kind of atom, either individually or combined into larger units.**	d) compound **a compound is a pure substance containing more than one kind of atom.**
e) formula **A formula is a symbolic representation of the ratio of atoms in an element or compound.**	f) solution **A solution is a homogeneous mixture of two or more substances.**

ICE1.2. What is the name of each of the following elements?

a) Ne
neon

b) Pb
lead

c) K
potassium

d) Pt
platinium

e) Sn
tin

f) F
fluorine

ICE1.3. What is the symbol of each of the following elements?

a) titanium
Ti

b) magnesium
Mg

c) americium
Am

d) uranium
U

e) neon
Ne

f) thallium
Tl

ICE1.4. Classify each of the following as chemical or physical change:

a) water boiling
physical

b) inhaling a small amount of helium
physical

c) burning of leaves
chemical

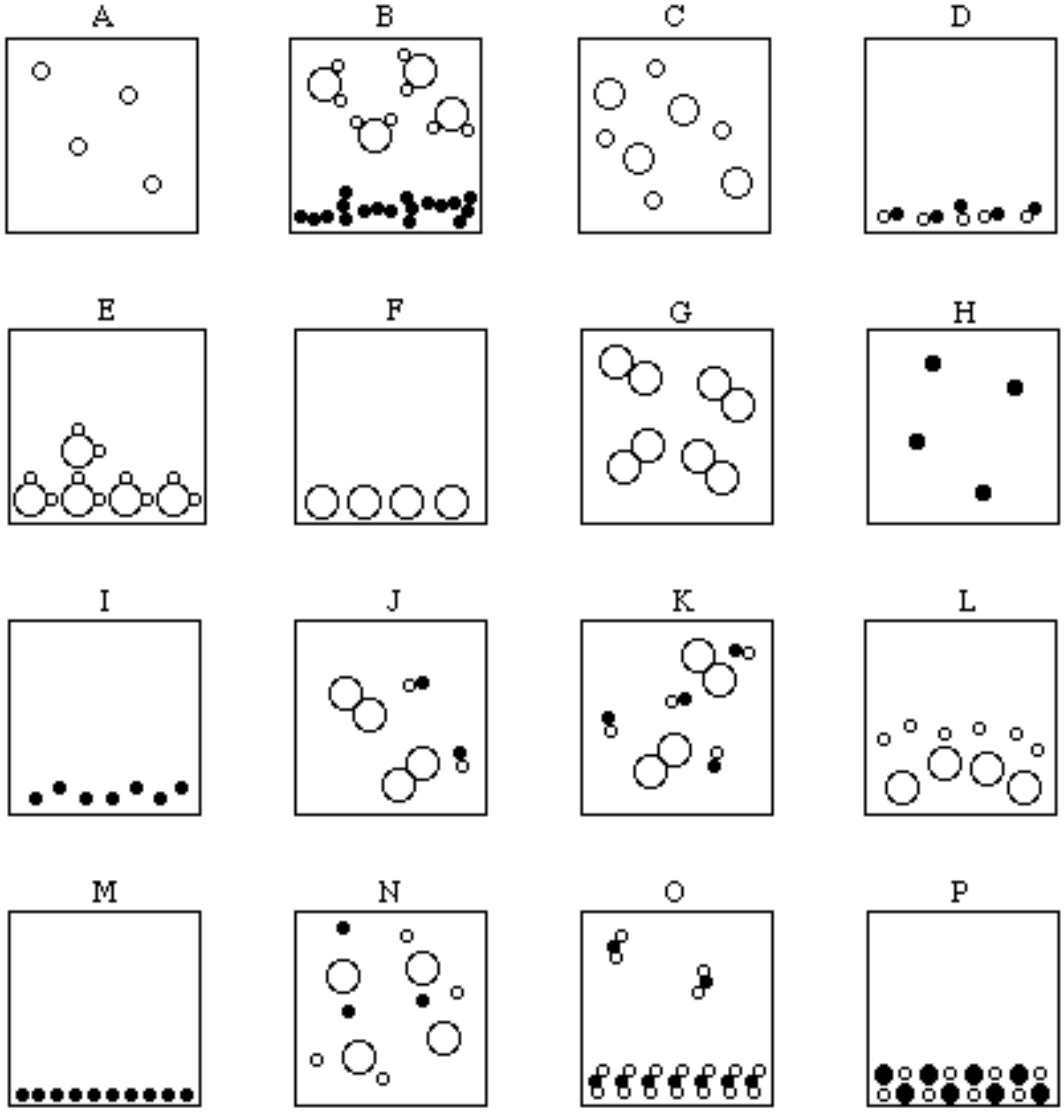
d) opening a soft drink can
physical

e) adding salt to liquid water
physical

ICE1.5. Each diagram (A - P) show a sample of substances as viewed at the atomic level. Characterize the contents of the container in terms of each of the following categories:

Category I. Homogeneous mixture, heterogeneous mixture or pure substance
Category II. Element(s), compound(s) or both
Category III. Solid, liquid, gas or combination of phases

As an example consider diagram A. Category I: pure substance; Category II: element; Category III: gas phase. It is a pure substance since there is a single type of matter in the container. It is an element since it exists as a monoatomic substance. Finally it is in the gas phase due to the totally random distribution of particles.



ICE1.5. (Continued)

Diagram	Category I	Category II	Category III
A	**pure substance**	**element**	**gas**
B	**heterogeneous mixture**	**Compound (gas) and element (liquid)**	**gas (top) and liquid (bottom)**
C	**homogeneous mixture**	**elements**	**gas**
D	**pure substance**	**compound**	**liquid**
E	**pure substance**	**compound**	**solid**
F	**pure substance**	**element**	**solid**
G	**pure substance**	**element**	**gas**
H	**pure substance**	**element**	**gas**
I	**pure substance**	**element**	**liquid**
J	**homogeneous mixture**	**Element (two atoms the same) and compound (atoms are different)**	**gas**
K	**homogeneous mixture**	**element and compound**	**gas**
L	**heterogeneous mixture**	**elements**	**liquids**
M	**pure substance**	**element**	**solid**
N	**homogeneous mixture**	**element**	**gas**
O	**pure substance**	**compound**	**solid and gas**
P	**pure substance**	**compound(ionic)**	**solid**

PS1.6. Express each of the following as either a decimal number or in standard scientific notation. (Report the re-expressed number to the correct number of significant figures.)

a) 8.900×10^{-6} **0.000008900**

b) 222,000 **2.22×10^{5}**

c) 6.023×10^{23} **602,300,000,000,000,000,000,000**

d) 0.003670 **3.670×10^{-3}**

e) 9.32×10^{2} **932**

e) 1.23 **1.23×10^{0}**

PS1.7. Indicate the number of significant figures in each of the following numbers;

a) 113.325 **6**

b) 0.0066 **2**

c) 2002 **4**

d) 4.10×10^{-4} **3**

e) 7.00×10^{5} **3**

f) 500,500 **4**

PS1.8. Round off each of the following numbers to the indicated number of significant digits;

a) 0.50505 (4 significant digits) **0.5051**

b) 123,000 (2 sig figs) **1.2×10^{5}**

c) 0.03455 (2 sig figs) **0.035**

d) 2.0499×10^{5} (2 sig figs) **2.0×10^{5}**

PS1.9. Complete each calculation and report the answer to the correct number of significant figures.

a) $4.5 - 4.05 - 0.050 =$ **0.4 (The result when added is 0.400. The number 4.5 has the least number of places to the right of the decimal, the answer can only have one digit to the right of the decimal.)**

b) $4.2337 \cdot 0.00706 =$ **0.0299 (The result when added is 0.2988992. The answer can only have as many significant digits as the measurement with the least number of significant digits. In this problem both 4.2337 has four sig figs. and 0.00706 has three significant digits, so the answer must have three significant digits.)**

c) $3.291 \times 10^{5} + 8.445 \times 10^{3} =$ **3.375×10^{5}**

$$\begin{array}{rl} 3.291 & \times 10^{5} \\ + \quad 0.08445 & \times 10^{5} \\ \hline 3.37545 & \times 10^{5} \end{array}$$

To the correct number of decimal places (significant figures) the answer is 3.375×10^{5}.

d) $10.105 - \dfrac{3.42}{(34.804 - 25.3)} =$ **9.75**

$10.105 - \dfrac{3.42}{(34.804 - 25.3)} = 10.105 - \dfrac{3.42}{(9.504)} =$

10.105 – 0.359848 (note 0.359848 must be reported to 2 significant digits, so it will be 0.36.)

$$\begin{array}{r|l} 10.10 & 5 \\ \underline{-0.36} & \\ 9.74 & 5 \end{array}$$

So the correct answer will be 9.75.

PS1.10. Perform the following conversions;

a) 100.0 yards to kilometers (use at least 3 conversions)

$$\mathbf{100.0\ yards}\left(\frac{3\ ft}{1\ yd}\right)\left(\frac{12\ inch}{1\ foot}\right)\left(\frac{2.54\ cm}{1\ inch}\right)\left(\frac{1\ m}{100\ cm}\right)\left(\frac{1\ km}{1000\ m}\right) = \mathbf{0.09144\ km}$$

b) 355 mLs (cm^3) to quarts

$$\mathbf{355\ mL}\left(\frac{1\ L}{1000\ mL}\right)\left(\frac{1.0567\ quart}{1\ L}\right) = \mathbf{3.75 \times 10^{-1}\ quarts}$$

c) 295 pounds to kilograms

$$\mathbf{2.95 \times 10^{2}\ pounds}\left(\frac{453.59\ g}{1\ pound}\right)\left(\frac{1\ kg}{1000\ g}\right) = \mathbf{134\ kg}$$

d) 3.00 km to micrometers

$$\mathbf{3.00\ km}\left(\frac{1000\ m}{1\ km}\right)\left(\frac{1.0 \times 10^{6}\ \mu m}{1\ m}\right) = \mathbf{3.00 \times 10^{6}\ micrometers}$$

e) 4.56 nanometers to decimeters

$$\mathbf{4.56\ nanometers}\left(\frac{1\ m}{10^{9}\ nm}\right)\left(\frac{10\ dm}{1\ m}\right) = \mathbf{4.56 \times 10^{-8}\ dm}$$

f) $5.10 \times 10^3\ ft^3$ to cm^3

$$\mathbf{5.10 \times 10^{3}\ ft^{3}}\left(\frac{12\ inch}{1\ foot}\right)^{3}\left(\frac{2.54\ cm}{1\ inch}\right)^{3}$$

$$= \mathbf{1.44 \times 10^{8}\ cm^{3}}$$

g) 1.1 gigawatts to watts

$$\mathbf{1.1\ gigawatts}\left(\frac{10^{9}\ watt}{1\ Gw}\right) = \mathbf{1.1 \times 10^{9}\ watts}$$