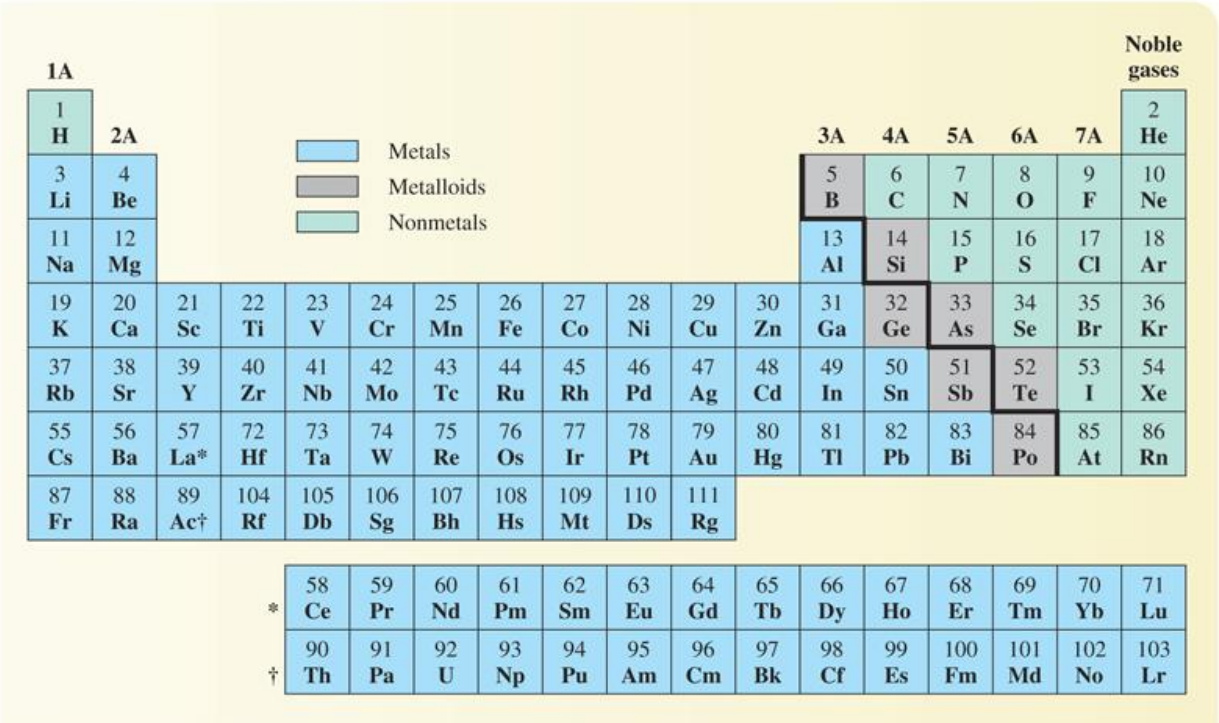
Chemistry 115
Dr. Cary Willard
Exam 1A

Name _____

September 17, 2008

| | Points Earned | Points Possible |
|---|---|---|
| Part 1<br>multiple choice | | 30 |
| Part 2<br>nomenclature | | 8 |
| Page 3 | | 32 |
| Page 4 | | 30 |
| | | |
| Total | | 100 |

Note: All work must be shown to receive credit. On calculation problems show answer with the correct number of significant figures using scientific notation if necessary.



Part 1 – Multiple Choice (30 points)

1. Why study chemistry?
   a. To help inform us about our world
   b. To be better able to make informed decisions
   c. To help us learn a technique for identifying and solving problems
   d. All the above

2. A simple statement of natural phenomena to which no exceptions are known under given conditions is a(n)
   a. theory
   b. observation
   c. model
   d. scientific law

3. Which is a mixture?
   a. copper wire
   b. sugar
   c. water
   d. mud

4. How many significant figures are in the number 1.500?
   a. 1
   b. 2
   c. 3
   d. 4

5. One centigram is equal to
   a. 0.001g
   b. 0.01g
   c. 100g
   d. 1000g

6. Subtract 14.3 from 130.670. The difference expressed to the correct number of significant figures is
   a. 116
   b. 116.3
   c. 116.4
   d. 116.37

7. The space occupied by a sample is its
   a. Mass
   b. Volume
   c. Length
   d. Temperature

8. When expressed in proper scientific notation the number 0.00364 is
   a. $3.64 \times 10^{3}$
   b. $3.64 \times 10^{2}$
   c. $3.64 \times 10^{-2}$
   d. $3.64 \times 10^{-3}$

9. Which type of element has the following general properties: low melting point and density, lacks luster, poor conductor of heat and electricity, and brittle?
   a. Metal
   b. Nonmetal
   c. Metalloid
   d. Transition element

10. The charge of a cation is

a. Positive b. Negative c. Neutral

11. How many atoms of oxygen are indicated in the formula $Fe(NO_3)_2$?

a. 2
b. 3
c. 5
d. 6

12. Which chemical symbol is properly written?

a. ca
b. Cu
c. CO
d. CL

13. Which is a halogen?

a. Chlorine
b. Helium
c. Potassium
d. Calcium

14. Which is a chemical change?

a. Iron rusting
b. Water freezing
c. Alcohol evaporating
d. Ice melting

15. Carbon, when burned completely, forms carbon dioxide. If 11.7g of carbon combines with 31.3g of oxygen, what mass of carbon dioxide will be produced?

a. 11.7g
b. 19.6g
c. 31.3g
d. 43.0g

Part 2 – Nomenclature (8 points)

Fill in the following chart with the correct name or formula for the following elements and compounds.

| Compound / Element Name | Formula / Elemental Symbol |
|---|---|
| Carbon | C |
| Sodium | Na |
| Chlorine | Cl |
| Copper | Cu |
| Magnesium sulfide | MgS |
| Copper(II) iodide | $CuI_2$ |
| Phosphorus pentabromide | $PBr_5$ |
| Nickel(III) fluoride | $NiF_3$ |

Part 3 – Problems and Questions (62 points)

1. (6 points) Evaluate each of the following expressions. State the answer to the proper number of significant figures.

   a. 12.64 + 1.5 + 0.63= 14.77 14.8

   b. $\frac{0.9532}{35.7} = 0.0267$

2. (8 points) Complete the following metric conversions using the correct number of significant figures
   a. 9.53 cm to mm

$$9.53\ cm \times \frac{1\ m}{100\ cm} \times \frac{1000\ mm}{1\ m} = 95.3\ mm$$

   b. 38.4 mL to L

$$38.4\ mL \times \frac{1\ L}{1000\ mL} = 0.0384\ L$$

3. (8 points) Complete the following American / metric conversions using the correct number of significant figures
   a. 0.74 m to in

$$0.74\ m \times \frac{100\ cm}{1\ m} \times \frac{1\ in}{2.54\ cm} = 29\ in$$

   b. 4.2 qt to mL

$$4.2\ qt \times \frac{946\ mL}{1\ qt} = 3970\ mL = 4.0 \times 10^3 mL$$

4. (5 points) Complete the following temperature conversion
   153 $^{o}$F to $^{o}$C

$$°C = (°F - 32°F)\frac{100°C}{180°F} = (153°F - 32°F)\frac{100°C}{180°F} = (121°F)\frac{100°C}{180°F} = 67°C$$

5. (5 points) Distinguish between homogeneous and heterogeneous mixtures. Give an example of each.
   Homogeneous mixtures are uniform throughout like apple juice. Heterogeneous mixtures are not uniform like orange juice with pulp.

6. (5 points) A strong camel can carry 827 lb. If one straw weighs 1.5 grams, how many straws can the camel carry without breaking his back? Give answer in scientific notation.

$$?\,straws = 827\ lb \times \frac{454\ g}{1\ lb} \times \frac{1\ straw}{1.5\ g} = 2.5 \times 10^5 straws$$

7. (5 points) The density of a sulfuric acid solution is 1.42 g/mL. What volume of the solution will weigh 275. grams?

$$?\,volume = 275\ g \times \frac{1\ mL}{1.42\ g} = 194\ mL$$

8. (5 points) How many atoms of oxygen are there in exactly seven dozen molecules of nitric acid, $HNO_3$?

$$?\,atom\ O = 7\ doz\ HNO_3 \times \frac{12\ \ HNO_3}{1\ doz\ HNO_3} \times \frac{3\ atom\ O}{1\ HNO_3} = 252\ atom\ O$$

9. (5 points) What is the fundamental difference between a chemical change and a physical change?

   In order to observe a chemical change you must change the identity of the substance. This is not necessary for a physical change – the identity of the substance in unchanged in physical changes

   Chemical changes represent chemical reactions whereas physical changes simply change the physical properties (size, state, etc.)

10. (5 points) A 3.64 g sample of a biological molecule contains 2.55 g of carbon. What is the mass percent of carbon in the compound?

$$?\,\%\ C = \left(\frac{mass\ carbon}{mass\ cmpd}\right) \times 100(\%)$$

$$= \left(\frac{2.55\ g\ C}{3.64\ g\ cmpd}\right) \times 100 = 70.1\%C$$

11. (5 points) A can of soda contains 21.5 % sugar by mass. How many grams of soda will contain 525 grams of sugar?

$$?\,g\ soda = 525\ g\ sugar \times \frac{100\ g\ soda}{21.5\ g\ sugar} = 2440\ g\ soda$$

$$= 2.44 \times 10^3 g\ soda$$