Honors Chemistry
Semester 1
Final Review

Ch. 1 Introduction to Chemistry

Chemistry: its branches, technology, scientific method, and problem solving.

1. Know the definition of matter.
2. Know the definition of chemistry
3. Know the scientific method.

Ch 2 Matter and Change

Properties of Matter

1. Know the following words: Physical vs Chemical properties and changes.
2. Categorize Matter as either homogeneous, heterogeneous, solution, compound, or, element.
3. Know the difference between physical & chemical properties. (Intensive vs extensive)
4. Know the difference between physical & chemical changes.

Ch 3 Scientific Measurement

1. Know the basic units of the SI system.
2. Know the prefixes of the SI system (micro-Mega).
3. Know how to convert between units & prefixed units. i.e. km to m
4. Know how to convert between different prefixed units. i.e. dm to km
5. Know how to convert between combinations & complex forms, i.e. mL to cm3, cm3 to dm3, km/h to m/sec
6. Know how to put a number into scientific notation.
7. Know how to change scientific notation to standard notation.
8. Know how to use significant digits
9. KNOW HOW TO CONVERT USING DIMENTIONAL ANALYSIS.

CH 4 Atomic Structure

1. Defining the Atom:
   a. Democritus to Dalton ideas about atoms
   b. Know the main point of Dalton's Atomic Theory.

2. Structure of the Nuclear Atom.
   a. Identify the three subatomic particles.
   b. Thompson and the electron.
   c. Rutherford's Atomic Model.

3. Distinguishing Between Atoms.
   a. Isotopes vs elements
   b. Atomic number, Atomic Mass, Mass Number. Know how to calculate the protons, neutrons and electrons in an atom.
   c. Into to the Periodic Table

CH 5 Electrons in Atoms

1. Models of the Atoms:
    a. Bohr's Model of the atom.
    b. The quantum mechanical model.
        i. Principle quantum number: main energy level
        ii. Angular Momentum Quantum Number: sublevels (s,p,d,f)
        iii. Magnetic Quantum Number: Orientation in space.
        iv. Spin quantum number: right or left spin.(two electron per house)
2. Electron arrangement in Atoms: electron configuration…
    a. Long way Germanium #32 $1s^2$, $2s^2$, $2p^6$, $3s^2$, $3p^6$, $4s^2$, $3d^{10}$, $4p^2$ Val electrons 4.
    b. Noble gas: Germanium #32 [Ar] $4s^2$, $3d^{10}$, $4p^2$. Valance electrons 4.
3. Physics and Quantum Mechanical Model:
    a. The source of electromagnetic spectrum.
    b. Electrons jump up into higher energy levels and fall down into lower levels releasing energy in the form of light.

CH 6 The Periodic Table

1. Organizing the Elements.
    a. The history of the Periodic Table.
    b. Three broad classes of elements
2. Classifying the Element
    a. describe the information in a periodic table
    b. Classify elements based on electron configuration and valence electrons.
    c. Distinguish represented elements and transition metals.
3. Periodic Trends
    a. Describe trends involving, Atomic size, ionization energy, electronegativity.
    b. Explain how ion are formed

CH 7 Ionic and Metallic Bonding

1. Ionic bonds
    a. Explain how the octet rule applies to ionic bonds. Metal with Nonmetal.
    b. Determine the number of valence electrons in an atom and predict whether it will gain or lose electrons (cation or anion)
    c. Describe three properties of Ionic compounds
    d. Typical Ionic bonds form between active metals with active nonmetals.
2. Bonding in metals.
    a. Describe the arrangement of atoms and valence electrons in metallic bonds.
    b. Explain the importance of alloys.
    c. Describe three properties of Metallic Bonds.

CH 8 Covalent Bonding

1. Nature of Covalent bonds
    a. Sharing electrons and the octet rule
    b. Drawing electron dot diagrams (Lewis structures)
    c. Draw molecules showing double and triple bonds
    d. Covalent vs Coordinate Covalent

2. Bonding Theories
    a. VSEPR theory and molecular geometry
    b. Hybridation involving Carbon.

3. Polar Bonds and Molecules
    a. Electronegativity differences determine the distribution of charge in polar molecules.
    b. Evaluate the strength of intermolecular attractions compared with the strength of ionic and nonpolar covalent bonds
    c. Understand the nature of Network Covalent Molecules and the properties associated with them.

CH 9 Chemical Names and Formulas

Chemical formulas, subscripts, coefficients, naming and writing compounds: traditional system and stock system and acids.

1. Know the following terms: symbol, formula, subscript, and polyatomic ion.
2. Know how to give the formula of a named compound.
3. Know how to give the name of a compound from a formula.
4. Know how to use the tables of oxidation numbers and polyatomic ions.
5. Know the elements that exist as diatomic molecules. (List them) HOFBrINCl

Ch 10 Chemical Quantities

The Mole: A Measurement of Matter

1. 1 mole = molar mass
2. 1 mole = 22.4 L @STP
3. 1 mole = 6.02×10^{23} particles

Percentage Composition, Empirical Formulas, and Molecular formulas

1. Percentage Composition is the elements mass divided by the compounds mass x 100.
2. Empirical Formula is the simplest whole number ratio of the atoms in a compound.
3. Molecular Formula is the actual number of each atom in the formula of a compound.

Worksheet starts next page..

Chapter 2

a. Give three physical properties _____, _____, _____

b. Give three chemical properties _____, _____, _____

c. Classify as chemical or physical properties: color (c or p), reactivity (c or p), flammability (c or p), malleability (c or p), solubility (c or p), melting point (c or p), rusts(c or p).

d. Classify as Homogeneous or Heterogeneous substances: chocolate milk (Ho or He), oxygen (Ho or He), magnesium (Ho or He), pizza (Ho or He), salt water (Ho or He), granite (Ho or He), and paint (Ho or He).

Chapter 3

Conversions: 45~~mg~~ $\frac{1\ gram}{1000\ ~~mg~~}$ = 0.045 g 2.05 kg ____mg 101hm _____mm

1.35 $\frac{km}{h}$ _____$\frac{m}{sec}$ 21cm^3 _____m^3

75.1ml ____cm^3 51cm^2 _____km^2 9dg _____g

1.2 X 10^2 cm _____mm 2.46 $\frac{g}{mL}$ _____ $\frac{hg}{L}$

Problems:

1. Find the density of an object that has a mass of 45g and a volume of 25.0 ml.

2. Find the mass of an object that has a density of 4.5g/cm3 and a volume of 11 ml.

3. Calculate the volume of an object in cm3 that has a mass of 22kg and a density of 8.2kg/L.

4. The density of aluminum is 2.70 g/cm3. Calculate the mass of aluminum that occupies 75.0 ml.

5. Convert to regular or scientific notation.

a) 12300= _____

b) 40120= _____

c) 1120000= _____

d) 0.0000123= _____

f) 1 x 10^3= _____

g) 1.110 x 10^4= _____

h) 2.12 x 10^{-5}= _____

I) 3.20 x 10^{-7}= _____

6. How many sig figs?

7300 ____ 0.00125 _____ 71253 _____ 5.012 _____ 0.5100 _____

7. Answer to the correct sig figs:

a) 85+2.3= _____

b) 213.213-12.3 = _____

c) 57+11.1= _____

d) 1.2x10$^{3\ +}$ 4.2x10^2=_____

e) 42.1/24= _____

f) 101x2134 _____

g) 2123/3143= _____

h) 2.23x10^5 x 5.2x10^3=_____

Chapter 4

1. How many protons neutrons, and electrons are in U-235. _____
2. Calculate the average atomic mass of lead containing the following isotopes: 1.4% of Lead-204, 24.1% of Lead-206, 22.1% of Lead-207, 52.4% Lead-208. (Show Work)

Chapter 5

Problems

1. Write the noble gas electron configuration and determine the valance electrons for…
    a. Lead _____
    b. Strontium _____
    c. Krypton _____
    d. Sodium _____
    e. Aluminum _____
    f. Chlorine _____

Chapter 7

1. Show a dot structure for NaCl
2. Show a dot structure for $CaCl_2$
3. Write the definition of an ionic bond _____.
4. Write the definition of a metallic bond _____.

Chapter 8

Draw Lewis structure for the following, determine the geometry of 2,3,4,5,7.

1. hydrogen gas (H_2)
2. SO_2
3. $(IO_3)^{-1}$
4. CCl_4
5. HCl
6. C_2H_2
7. CO_2

Of the molecules/polyatomic ions above, three show polarity, identify the three and show the relative positive and negative ends of the molecules.

Chapter 9

Give the formula:

a) potassium nitrate _____ d) manganese (II) oxide _____

b) iron (III) chloride _____ e) ammonium bromide _____

c) sodium carbonate _____ f) tin (IV) phosphate _____

Name the following:

1. $CaCO_3$ _____ 4. AgBr _____

2. $CuCl_2$ _____ 5. SnO_4 _____

3. SnS_2 _____ 6. $CdSO_4$ _____

Name the following molecular compounds

1. PCl_3 _____ 3. SiO_2 _____

2. CCl_4 _____ 4. N_2O_5 _____

Write chemical formula for:

1. carbon disulfide _____

2. dinitrogen trioxide _____

3. oxygen difluoride _____

4. nitrogen monoxide _____

Name the following acids

1. HNO_3 _____

2. H_2SO_4 _____

3. HCl _____

4. $HC_2H_3O_2$ _____

Write the chemical formulas for the following acids:

1. phosphoric acid _____ 5. phosphorous acid _____

2. hydrobromic acid _____ 6. chlorous acid _____

3. sulfuric acid _____ 7. hydroiodic acid _____

Chapter 10

Calculate the Molar mass (to the nearest .1 grams) of:

1. $Ca(OH)_2$ _____ 2. Iron (III) Carbonate _____

1. How many oxygen atoms are present in 0.500 mol of CO_2?

2. How many moles are present in 10.37 g of LiF?

3. What is the empirical formula for a compound that is 43.6% phosphorous and 56.4% oxygen?

4. What is the empirical formula for a compound that is 7.9% lithium and 92.1% bromine?

5. A compounds empirical formula is N_2O_5. If the molar mass is 108 amu, what is the molecular formula?

6. Find the percent composition of $Ca_3(PO_4)_2$

7. Calculate the Percent composition, empirical formula, and molecular formula of Acetaminophen if a 10.00g sample contains 6.36g carbon, .596g hydrogen, .927g nitrogen and 2.11 g oxygen and the molar mass is 151.15 g/mole.