Welcome to Honors Chemistry II/AP ! I hope you have a fun and restful summer. I look forward to seeing you in August.

Please send me a quick email (mary.eisenhauer@knoxschools.org) to confirm you received this packet and to provide me with your email address.

1. Summer Review Assignment – 32 Review Questions (pages 3-8)

The purpose of the review assignment is to remind you of and sharpen your current skills, so I recommend you wait until August to complete the problems.
The review assignment is due **Monday August 7nd,** the first day of school

2. Memorization Task – polyatomic ions (Page 2)

The first quiz, on half of the positive ions (those highlighted in yellow), will be given during the second week of school – **Wednesday August 16**, with the negative ions quiz coming a week or so after that.

Before the first day of school:

- Work through the Review Assignment. There may be a few questions for which you will need your textbook (if you cannot find the answers online). You can check your answers in the back of the textbook you will receive the first day of school.

  I expect you to have mastered or at least be reasonably comfortable with all of Chapters 1 and 2, plus Chapter 3 through Sec. 3.4 of the textbook by the end of the third week of school. We will spend minimal class time reviewing this material. I will be available to help you outside of class if you need it.

- Begin the memorization task – e.g. make flashcards, begin practicing.

Proposed schedule for the beginning of the school year:

Mon. 8/7
- Sign out textbooks and other support materials
- Turn in summer assignment

Tues. 8/8
- Avogadro Goes to Court, dimensional analysis activity
- Positive Ions quiz (see Memorization Packet) – HALF positive ions

Wed. 8/9
- Review quiz chapter 1/2
- Complete first online quiz (on Chapter 1)
  HW: Prepare for Lab 1 – Determining the formula of a hydrate, complete % composition practice problems from textbook

Thurs. 8/10
- Pre-lab - Determining the formula of a hydrate
- Review quiz chapter 3

Friday. 8/11
- Lab 1

Cations

Aluminum	Al^{3+}
Ammonium	NH_4^+
Antimony	(III) Sb^{3+}
	(V) Sb^{5+}
Arsenic	(III) As^{3+}
	(V) As^{5+}
Barium	Ba^{2+}
Bismuth	(III) Bi^{3+}
	(V) Bi^{5+}
Calcium	Ca^{2+}
Cadmium	Cd^{2+}
Chromium (II) or chromous	Cr^{2+}
(III) or chromic	Cr^{3+}
Cobalt (II) or cobaltous	Co^{2+}
(III) or cobaltic	Co^{3+}
Copper (I) or cuprous	Cu^+
(II) or cupric	Cu^{2+}
Hydrogen	H^+
Hydronium	H_3O^+
Iron (II) or ferrous	Fe^{2+}
(III) or ferric	Fe^{3+}
Lead (II) or pl.umbous	Pb^{2+}
(IV) or plumbic	Pb^{4+}
Lithium	Li^+
Magnesium	Mg^{2+}
Manganese	(II) Mn^{2+}
	(IV) Mn^{4+}
Mercury (I) or mercurous	Hg_2^{2+}
(II) or mercuric	Hg^{2+}
Nickel	(II) Ni^{2+}
	(III) Ni^{3+}
Potassium	K^+
Silver	Ag^+
Sodium	Na^+
Strontium	Sr^{2+}
Tin (II) or stannous	Sn^{2+}
(IV) or stannic	Sn^{4+}
Zinc	Zn^{2+}

Anions

Acetate	$C_2H_3O_2^-$
Arsenate	AsO_4^{3-}
Bicarbonate	HCO_3^-
Binoxalate	$HC_2O_4^-$
Bisulfate	HSO_4^-
Bisulfide	HS^-
Bisulfite	HSO_3^-
Borate	BO_3^{3-}
Bromate	BrO_3^-
Bromide	Br^-
Bromite	BrO_2^-
Carbonate	CO_3^{2-}
Chlorate	ClO_3^-
Chloride	Cl^-
Chlorite	ClO_2^-
Chromate	CrO_4^{2-}
Cyanide	CN^-
Dichromate	$Cr_2O_7^{2-}$
Dihydrogen phosphate	$H_2PO_4^-$
Fluoride	F^-
Hydroxide	OH^-
Hypobromite	BrO^-
Hypochlorite	ClO^-
Hypoiodite	IO^-
Iodate	IO_3^-
Iodide	I^-
Iodite	IO_2^-
Nitride	N^{3-}
Nitrate	NO_3^-
Nitrite	NO_2^-
Oxalate	$C_2O_4^{2-}$
Oxide	O^{2-}
Perbromate	BrO_4^-
Perchlorate	ClO_4^-
Permanganate	MnO_4^-
Peroxide	O_2^{2-}
Phosphate	PO_4^{3-}
Phosphide	P^{3-}
Phosphite	PO_3^{3-}
Sulfate	SO_4^{2-}
Sulfide	S^{2-}
Sulfite	SO_3^{2-}
Tartrate	$C_4H_4O_6^{2-}$
Thiocyanate	SCN^-
Thiosulfate	$S_2O_3^{2-}$

Review Questions from Brown and LeMay: Chemistry the Central Science, 11th edition

Chapter 1 "Introduction: Matter and Measurement" Assignments

Classification and Properties of Matter: Exercises: p.31: #11,15,16

11. Classify each of the following as a pure substance or a mixture; if a mixture, indicate whether it is homogeneous or heterogeneous:
    a) rice pudding
    b) seawater
    c) magnesium
    d) gasoline

15. A solid white substance A is heated strongly in the absence of air. It decomposes to form a new white substance B and a gas C. The gas has exactly the same properties as the product obtained when carbon is burned in an excess of oxygen. Based on these observations, can we determine whether solids A and B and the gas C are elements or compounds? Explain your conclusions for each substance.

16. In the process of attempting to characterize a substance, a chemist makes the following observations: The substance is a silvery white, lustrous metal. It melts at 649°C and boils at 1105°C. Its density at 20°C is 1.738 g/cm^3. The substance burns in air, producing an intense white light. It reacts with chlorine to give a brittle white solid. The substance be pounded into thin sheets or drawn into wires. It is a good conductor of electricity. Which of these characteristics are physical properties, and which are chemical properties?

Units of Measurement: Exercises: p. 32: #23, 27

23. What power do the following abbreviations represent?
    a) d
    b) c
    c) f
    d) μ
    d) M
    e) k
    f) n
    g) m
    h) p

27. a) A sample of carbon tetrachloride, a liquid once used in dry cleaning, has a mass of 39.73 g and a volume of 25.0 mL at 25°C. What is its density at this temperature? Will carbon tetrachloride float on water?
    b) The density of platinum is 21.45 g/cm^3 at 20°C. Calculate the mass of 75.00 cm^3 of platinum at this temperature.
    c) The density of magnesium is 1.738 g/cm^3 at 20°C. What is the volume of 87.50 g of this metal at this temperature?

Uncertainty in Measurement: Exercises: pp. 32,33: #35, 39

35. What is the number of significant figures in each of the following measured quantities:
    a) 358 kg
    b) 0.0054 s
    c) 6.3050 cm
    d) 0.0105 L
    e) 7.0500×10^{-3} m^3

39. Carry out the following operations, and express the answers with the appropriate numbers of significant figures:
    a) 12.0550 + 9.05
    b) 257.2 - 19.789
    c) $(6.21 \times 10^3)(0.1050)$
    d) 0.0577/75.3

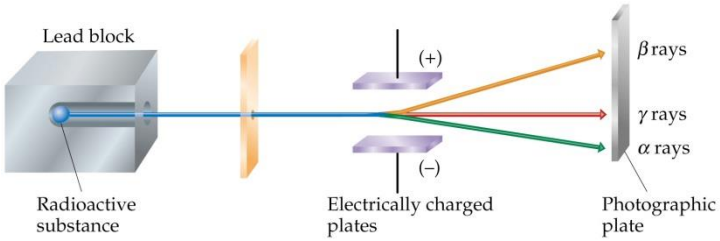
Dimensional Analysis: Exercises: p. 33: #53

53. The Morgan silver dollar has a mass of 26.73 g. By law, it was required to contain 90% silver, with the remainder being copper.
    a) When the coin was minted in the late 1800s, silver was worth $1.18 per troy ounce (31.1 g). At this price, what is the value of the silver in the silver dollar?
    b) Today, silver sells for $13.25 per troy ounce. How many Morgan silver dollars are required to obtain $25.00 worth of pure silver?

Chapter 2 "Atoms, Molecules and Ions" Assignments

The Atomic Theory and The Discovery of Atomic Structure: Exercises: pp. 69-71: #1

1. A negatively charged particle is caused to move between two electrically charged plates, as illustrated below



    a) Why does the path of the charged particle bend?
    b) As the charge on the plates is increased, would you expect the bending to increase, decrease, or stay the same?
    c) As the mass of the particle is increased while the speed of the particles remains the same, would you expect the bending to increase, decrease, or stay the same?
    d) An unknown particle is sent through the apparatus. Its path is deflected in the opposite direction from the negatively-charged particle, and it is deflected by a smaller magnitude. What can you conclude about this unknown particle?

The Modern View of Atomic Structure and Atomic Weights: Exercises: pp. 71,72: # 17, 20, 23, 25, 29, 31

20. Determine whether each of the following statements is true or false; if false, correct the statement to make it true:
    a) The nucleus has most of the mass and comprises most of the volume of an atom;
    b) Every atom of a given element has the same number of protons;
    c) The number of electrons in an atom equals the number of neutrons in the atom;
    d) The protons in the nucleus of the helium atom are held together by a force called the strong nuclear force.

23. How many protons, neutrons, and electrons are in the following atoms:
    a) ^{40}Ar
    b) ^{65}Zn
    c) ^{70}Ga
    d) ^{80}Br

25. Fill in the gaps in the following table assuming each column represents a neutral atom:

Symbol	^{52}Cr				
Protons		25			82
Neutrons		30	64		
Electrons			48	86	
Mass number				222	207

31. Only two isotopes of copper occur naturally, ^{63}Cu (atomic mass = 62.9296 amu; abundance 69.17%) and ^{65}Cu (atomic mass = 64.9278; abundance 30.83%). Calculate the atomic weight (average atomic mass) of copper.

The Periodic Table and Molecules and Molecular Compounds: Exercises: pp. 72,73: #38, 40, 43, 51

38. Locate each of the following elements in the periodic table; indicate whether it is a metal, metalloid, or non-metal; and give the name of the element:
    a) Ti
    b) Ga
    c) Th
    d) Se
    e) Kr

51. Each of the following elements is capable of forming an ion in chemical reactions. By referring to the periodic table, predict the charge of the most stable ion of each:
    a) Mg
    b) Al
    c) K
    d) Se
    e) F

Ions and Ionic Compounds: Exercises: p. 73: #53, 55, 59

53. Using the periodic table to guide you, predict the formula and name of the compound formed by the following elements:
    a) Ga and F
    b) Li and H
    c) Al and I
    d) K and S

55. Predict the empirical formula for the ionic compound formed by
    a) Ca^{2+} and Br^{-}
    b) K^{+} and CO_3^{2-}
    c) Al^{3+} and $C_2H_3O_2^{-}$
    d) NH_4^{+} and SO_4^{2-}

59. Predict whether each of the following compounds is molecular or ionic:
    a. B_2H_6
    b. CH_3OH
    c. $LiNO_3$
    d. Sc_2O_3
    e. CsBr

Naming Inorganic Compounds and Some Simple Organic Compounds: Exercises: p. 74: #67, 69, 73

67. Give the chemical formula for each of the following ionic compounds:
    a) aluminum hydroxide
    b) potassium sulfate
    c) copper(I) oxide
    d) zinc nitrate
    e) mercury(II) bromide
    f) iron(III) carbonate
    g) sodium hypobromite

69. Give the chemical formula for each of the following acids:
    b) hydrobromic acid
    c) phosphoric acid
    d) hypochlorous acid
    e) iodic acid
    f) sulfurous acid

73. Write the chemical formula for each substance mentioned in the following word descriptions.
    a) Zinc carbonate can be heated to form zinc oxide and carbon dioxide.
    b) On treatment with hydrofluoric acid, silicon dioxide forms silicon tetrafluoride and water.
    c) Sulfur dioxide reacts with water to form sulfurous acid.

Chapter 3 "Stoichiometry: Calculations with Chemical Formulas and Equations" Assignments

Some Simple Patterns of Chemical Reactivity: Exercises: p. 110: #17, 20

17. Write a balanced chemical equation for the reaction that occurs when
    a) solid magnesium reacts with chlorine gas;
    b) barium carbonate decomposes into barium oxide and carbon dioxide gas when heated;
    c) the hydrocarbon styrene, $C_8H_{8(l)}$, is combusted in air;
    d) dimethylether, $C_3OCH3_{(g)}$, is combusted in air.

20. Balance the following equations, and indicate whether they are combination (synthesis, decomposition, or combustion reactions:
    a) $C_3H_{6(g)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(g)}$
    b) $NH_4NO_{3(s)} \rightarrow N_2O_{(g)} + H_2O_{(g)}$
    c) $C_5H_6O_{(l)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(g)}$
    d) $N_{2(g)} + H_{2(g)} \rightarrow NH_{3(g)}$
    e) $K_2O_{(s)} + H_2O_{(l)} \rightarrow KOH_{(aq)}$

Formula Weights: Exercises: pp. 110,111: # 24

24. Calculate the percentage by mass of the indicated element in the following compounds:
    a) carbon in acetylene, C_2H_2, a gas used in welding
    b) hydrogen in ascorbic acid, $HC_6H_7O_6$, also known as vitamin C
    c) hydrogen in ammonium sulfate, $(NH_4)_2SO_4$, a substance used as a nitrogen fertilizer

The Mole: Exercises: pp. 111: #29, 35, 37

29. Without doing any detailed calculations (but using a periodic table to give atomic weights), rank the following samples in order of increasing number of atoms: 0.50 mol H_2O; 23 g Na; 6.0×10^{23} N_2 molecules.

35. a) What is the mass, in grams, of 2.50×10^{-3} mol of ammonium phosphate?
    b) How many moles of chloride ions are in 0.2550 g of aluminum chloride?
    c) What is the mass, in grams, of 7.70×10^{20} molecules of caffeine, $C_8H_{10}N_4O_2$?
    d) What is the molar mass of cholesterol if 0.00105 mol weighs 0.406 g?

37. The molecular formula of allicin, the compound responsible for the characteristic smell of garlic, is $C_6H_{10}OS_2$.
    a) What is the molar mass of allicin?
    b) How many moles of allicin are present in 5.00 mg of this substance?
    c) How many molecules of allicin are in 5.00 mg of this substance?
    d) How many S atoms are present in 5.00 mg of allicin?

Empirical Formulas from Analysis: Exercises: pp. 112: 43, 47, 49

43. Give the empirical formula of each of the following compounds if a sample contains
    a) 0.0130 mol C, 0.0390 mol H, and 0.0065 mol O
    b) 11.66 g iron and 5.01 g oxygen
    c) 40.0% C, 6.7% H, and 53.3% O by mass

47. What is the molecular formula of each of the following compounds?
    a) empirical formula CH_2, molar mass = 84 g/mol
    b) empirical formula NH_2Cl, molar mass = 51.5 g/mol

Quantitative Information from Balanced Equations: Exercises: p. 113: # 57, 61, 64

57. Hydrofluoric acid, $HF_{(aq)}$, cannot be stored in glass bottles because compounds called silicates in the glass are attacked by the $HF_{(aq)}$. Sodium silicate (Na_2SiO_3), for example, reacts as follows:

    $Na_2SiO_{3\,(s)} + 8\ HF_{(aq)} \rightarrow H_2SiF_{6(aq)} + 2\ NaF_{(aq)} + 3\ H_2O_{(l)}$

    a) How many moles of HF are needed to react with 0.300 mol of Na_2SiO_3?
    b) How many grams of NaF form when 0.500 mol of HF reacts with excess Na_2SiO_3?
    c) How many grams of Na_2SiO_3 can react with 0.800 g of HF?

61. Aluminum sulfide reacts with water to form aluminum hydroxide and hydrogen sulfide.
    a) Write the balanced chemical equation for this reaction.
    b) How many grams of aluminum hydroxide are obtained from 10.5 g of aluminum sulfide?

64. The complete combustion of octane, C_8H_{18}, a component of gasoline, proceeds as follows:

    $2\ C_8H_{18(l)} + 25\ O_{2(g)} \rightarrow 16\ CO_{2(g)} + 18\ H_2O_{(g)}$

    a) How many moles of O_2 are needed to burn 1.25 mol of C_8H_{18}?
    b) How many grams of O_2 are needed to burn 10.0 g of C_8H_{18}?
    c) Octane has a density of 0.692 g/mL at 20°C. How many grams of O_2 are required to burn 1.00 gal of C_8H_{18}?