AP Chemistry is not all about memorization; however, having the following items memorized is essential for success in learning the concepts covered in the course. Make flashcards, have your friends and family quiz you, take the lists with you on vacation, or do whatever it takes to get this information firmly planted in your head.

Five things to memorize: (they are attached for your convenience)

1) Rules for determining oxidation numbers
2) Solubility rules
3) Rules for naming ionic compounds
4) Rules for naming acids
5) Common ions and Polyatomic ions

Solubility Rules

1. Salts containing Group I elements are soluble (Li^+, Na^+, K^+, Cs^+, Rb^+). Exceptions to this rule are rare. Salts containing the ammonium ion (NH_4^+) are also soluble.

2. Salts containing nitrate ion (NO_3^-) are generally soluble.

3. Salts containing Cl^-, Br^-, I^- are generally soluble. Important exceptions to this rule are halide salts of Ag^+, Pb^{2+}, and $(Hg_2)^{2+}$. Thus, $AgCl$, $PbBr_2$, and Hg_2Cl_2 are all insoluble.

4. Most silver salts are insoluble. $AgNO_3$ and $Ag(C_2H_3O_2)$ are common soluble salts of silver; virtually anything else is insoluble.

5. Most sulfate salts are soluble. Important exceptions to this rule include $BaSO_4$, $PbSO_4$, Ag_2SO_4 and $SrSO_4$.

6. Most hydroxide salts are only slightly soluble. Hydroxide salts of Group I elements are soluble. Hydroxide salts of Group II elements (Ca, Sr, and Ba) are slightly soluble. Hydroxide salts of transition metals and Al^{3+} are insoluble. Thus, $Fe(OH)_3$, $Al(OH)_3$, $Co(OH)_2$ are not soluble.

7. Most sulfides of transition metals are highly insoluble. Thus, CdS, FeS, ZnS, Ag_2S are all insoluble. Arsenic, antimony, bismuth, and lead sulfides are also insoluble.

8. Carbonates are frequently insoluble. Group II carbonates (Ca, Sr, and Ba) are insoluble. Some other insoluble carbonates include $FeCO_3$ and $PbCO_3$.

9. Chromates are frequently insoluble. Examples: $PbCrO_4$, $BaCrO_4$

10. Phosphates are frequently insoluble. Examples: $Ca_3(PO_4)_2$, Ag_3PO_4

11. Fluorides are frequently insoluble. Examples: BaF_2, MgF_2 PbF

Naming Covalent Compounds Rules

RULES FOR NAMING COVALENT COMPOUNDS

Diatomic Molecule (*1 element only*)

- Br_2, I_2, N_2, Cl_2, H_2, O_2, F_2
- Name the element!

Examples:

- **H_2** ______________________________
- **I_2** ______________________________

Covalent Binary (*Nonmetal / Nonmetal*)

- Name the first element
  - Add appropriate **prefixes** *EXCEPT* **"mono-"**
- Name the second element
  - Add appropriate **prefixes** *INCLUDING* "**mono-**"
- Change ending of second element to "**-ide**"

Examples:

- **P_2O_5** ______________________________
- **CO** ______________________________

WHAT IS A PREFIX?

- A word added to the beginning of an element name that indicates how many of that element is present

PREFIXES

Look at the subscripts to tell you how many of each element you have

One	***mono-***
Two	***di-***
Three	***tri-***
Four	***tetra-***
Five	***penta-***
Six	***hexa-***
Seven	***hepta-***
Eight	***octa-***
Nine	***nona-***
Ten	***deca-***

Rules for Naming Binary Ionic Compounds

Examples:

NaCl – sodium chloride BaF2 – barium fluoride CuO – copper (II) oxide

1. The full name of the cation is listed first. (A cation is a positive ion).
2. The root of the anion name is listed second and is followed by the suffix "ide."(An anion is a negative ion).
3. If the compound contains a transition metal, a Roman numeral is included after the cation name to indicate the oxidation number of the metal.
4. Remember that the cation(s) and anion(s) combine in the simplest ratio that balances the charge. That is, the sum of the charge must be equal to zero in the compound formed.

Rules for Naming Ionic Compounds Containing Polyatomic Ions

Examples:

$CaCO_3$- calcium carbonate $Fe(OH)_3$-iron (III) hydroxide $(NH_4)_2SO_4$ – ammonium sulfate

1. The full name of the cation is listed first.
2. The full name of the anion is listed second.
3. Use the table below for common polyatomic ions
4. Remember that the cation(s) and anion(s) combine in the simplest ratio that balances the charge. That is, the sum of the charge must be equal to zero in the compound formed.
5. Finally, use parentheses when the simplest ratio requires more than one polyatomic ion in the compound formula.

Naming Acids Rules

RULES FOR NAMING ACIDS

H + Element

- **Hydro** + ***root*** *of element name* + **-ic acid**

Examples:

- **H_3N** ______________________________
- **HI** ______________________________

H + Polyatomic Ion

Root of polyatomic ion name + appropriate ending:

- Polyatomic ion ends in "**-ate**" change ending to "**-ic** acid"
- Polyatomic ion ends in "***-ite***" change ending to "**-ous** acid"

Examples:

- **H_2SO_4** ______________________________
- **$HClO_2$** ______________________________

WHAT IS A ROOT?

- *the **first part** of an element or polyatomic ion name:*

Example:

Nitrogen = ***Nitr-***

Chlorine = ***Chlor-***

REMEMBER!!!!!

-ate -ic

-ite -ous

Polyatomic Ions

Polyatomic Ions:

Polyatomic Ions are ions that contain a number of atoms. There is a list of polyatomic ions below. There is no formula for learning how to write their names, you must commit them to memory. (When you commit them to memory, remember the charges, names, and formulas.) Naming Polyatomic compounds is much like naming Binary I or II compounds. Remember transition metals usually form two or more ions and parentheses and Roman numeral should be used.

Memorize the following items. Know name, formula (or symbol) and charges:

Positive Ions (Cations)

1+	2+	3+	4+
ammonium NH_4^+	barium Ba^{2+}	aluminum Al^{3+}	carbon C^{4+}
cesium Cs^+	beryllium Be^{2+}	antimony(III) Sb^{3+}	lead(IV) Pb^{4+}
copper(I) Cu^+	cadmium(II) Cd^{2+}	bismuth(III) Bi^{3+}	silicon Si^{4+}
gold(I) Au^+	calcium Ca^{2+}	chromium(III) Cr^{3+}	tin(IV) Sn^{4+}
hydrogen H^+	chromium(II) Cr^{2+}	cobalt(III) Co^{3+}	
lithium Li^+	cobalt(II) Co^{2+}	gallium Ga^{3+}	
potassium K^+	copper(II) Cu^{2+}	gold(III) Au^{3+}	
rubidium Rb^+	iron(II) Fe^{2+}	manganese(III) Mn^{3+}	**5+**
silver Ag^+	lead(II) Pb^{2+}	nickel(III) Ni^{3+}	antimony(V) Sb^{5+}
sodium Na^+	magnesium Mg^{2+}	iron(III) Fe^{3+}	bismuth(V) Bi^{5+}
	manganese(II)Mn^{2+}		
	mercury(I) Hg_2^{2+}		
	mercury(II) Hg^{2+}		
	nickel(II) Ni^{2+}		
	strontium Sr^{2+}		
	tin(II) Sn^{2+}		
	zinc Zn^{2+}		

Memorize the following items. Know name, formula (or symbol) and charges:

Negative Ions (Anions)

-1	-2	-3	-4
acetate CH_3COO^-	carbonate CO_3^{2-}	arsenide As^{3-}	carbide C^{4-}
bromide Br^-	chromate CrO_4^{2-}	nitride N^{3-}	
chlorate ClO_3^-	dichromate $Cr_2O_7^{2-}$	phosphate PO_4^{3-}	
chloride Cl^-	oxalate $C_2O_4^{2-}$	phosphide P^{3-}	
chlorite ClO_2^-	oxide O^{2-}	phosphite PO_3^{3-}	
cyanide CN^-	peroxide O_2^{2-}		
fluoride F-	silicate SiO_3^{2-}		
hydride H-	sulfate SO_4^{2-}		
hydrogen carbonate HCO_3- (bicarbonate)	sulfide S^{2-}		
hydroxide OH-	sulfite SO_3^{2-}		
hypochlorite OCl-	thiosulfate $S_2O_3^{2-}$		
iodate IO_3-			
iodide I-			
nitrate NO_3-			
nitrite NO_2-			
perchlorate ClO_4-			
permanganate MnO_4-			
thiocyanate SCN-			

Name ___________________________

Worksheet #1
Significant Figures and Dimensional Analysis

For each problem below, write the equation and show your work. Always use units and box your final answer.

1. Round each of the following numbers to four significant figures, and express the result in scientific notation on the line provided:

   a. 300.235800 ________________

   b. 456,500 ________________

   c. 0.006543210 ________________

   d. 0.000957830 ________________

   e. – 0.035000 ________________

2. Carry out the following operations, and express the answers with the appropriate number of significant figures on the line provided:

   a. 1.24056 + 75.80 ________________

   b. 23/67 - 75 ________________

   c. 890,000 x 112.3 ________________

   d. 78,132 / 2.50 ________________

   e. 1.23 + 75 ________________

   f. 1.89 - .20 ________________

   g. 45.6 x 8.2 ________________

   h. 234 / 0.298 ________________

   i. 0.887 + 0.3 ________________

   j. 2340 - 100 ________________

   k. (8 + 9)/(34.0 – 20.) ________________

l. 0.8897 x 2.15 + 0.002/.1 ________________

m. 45.0 x 9.0 + 89.22/ 75 ________________

n. (2.88 + .5) x (23,000 - 0.11) ________________

For each problem below, show your work. Always use units and box in your final answer.

3. The density of pure silver is 10.5 g/cm^3 at 20ºC. If 5.25 g of pure silver pellets are added to a graduated cylinder containing 11.2 mL of water, to what volume level will the water in the cylinder rise?

4. The density of air at ordinary atmospheric pressure and 25ºC is 1.19 g/L. What is the mass, in kilograms, of the air in a room that measures 12.5 x 15.5 x 8.0 ft?

5. An aluminum block has a density of 2.70 g/mL. If the mass of the block is 24.60 g, find the volume of the substance.

6. A student can eat 4.0 M&Ms every 1.00 seconds. If an M&M has a mass of 63 mg, determine how many kilograms of M&Ms can be eaten by a class of 20 students in 3 hours and 45 minutes.

7. Convert the following measurements to the desired unit:

a. 0.050 cm =________mm

b. 1872 mg =_________kg

c. 1.9 dL =__________cL

d. 3.4x10-3 ks =__________c

Name ___________________________

Worksheet #2
Structure of the Atom and the Periodic Table

1. What were the main points of Dalton's Atomic Theory? Which of these points are still accepted today? Which ones do we no longer accept, and why?

2. Summarize the evidence used by J.J. Thomson to argue that cathode rays consist of negatively charged particles.

3. Let's pretend you are holding two atoms of carbon that are isotopes. Describe what the two atoms have in common and how they are different.

4. Fill in the gaps in the table, assuming each column represents a neutral atom:

Symbol	$^{39}_{19}K$				
# Protons		25			82
# Neutrons		30	64		
# Electrons			48	56	
Mass #				137	207

5. Write the correct symbol, with both superscripts and subscripts, for each of the following:

   a) the isotope of sodium with mass 23 ________________

   b) the atom of vanadium that contains 28 neutrons ________________

   c) the isotope of chlorine with mass 37 ________________

   d) an atom of magnesium that has an equal number of protons and neutrons ________________

6. Give the name and the common charge for elements found in each of these groups of the Periodic Table:

a) Group 1____________________________ b) Group 2 ____________________________

c) Group 17____________________________ d) Group 18 ____________________________

6. Describe where each type of element is found on the Periodic Table:

a) metals__________________________________ b) nonmetals ____________________________

c) transition metals__________________________ d) lanthanides ____________________________

d) actinides _______________________________

Name ___________________________

Worksheet #3
Naming Inorganic Compounds

1. Give the name for each of the following ionic compounds:
   a. AlF_3 ____________________
   b. $Fe(OH)_2$ ____________________
   c. $Cu(NO_3)_2$ ____________________
   d. $Ba(ClO_4)_2$ ____________________
   e. Li_3PO_4 ____________________
   f. Hg_2S ____________________
   g. $Ca(C_2H_3O_2)_2$ ____________________
   h. $Cr_2(CO_3)_3$ ____________________
   i. K_2CrO_4 ____________________
   j. $(NH_4)_2SO_4$ ____________________

2. Write the chemical formula for each of the following compounds:
   a. copper (I) oxide ____________
   b. potassium peroxide ____________
   c. aluminum hydroxide ____________
   d. zinc nitrate ____________
   e. mercury (I) bromide ____________
   f. iron (III) carbonate ____________
   g. sodium hypobromite ____________

3. Give the name or chemical formula, as appropriate, for each of the following acids:
   a. $HBrO_3$ ____________________
   b. HBr ____________________
   c. H_3PO_4 ____________________
   d. hypochlorous acid ____________________
   e. iodic acid ____________________
   f. sulfurous acid ____________________

4. Give the name or chemical formula, as appropriate, for each of the following molecular substances:
   a. SF_6 ________________________________
   b. IF_5 ________________________________
   c. XeO_3 ________________________________
   d. dinitrogen tetroxide ________________________________
   e. hydrogen cyanide ________________________________
   f. tetraphosphorous hexasulfide ________________________________

Name ____

Worksheet #4 Writing Chemical Equations

For each equation below, identify the type (synthesis, decomposition, single replacement, double replacement, or combustion), predict the products, and then write the balanced equation for the reaction. Remember to use the solubility rules for double replacement reactions and the activity series for single replacement reactions. Hint: when writing these reactions, ignore all of the information about heat, or bubbling, or mixing. These are just excess words used to make complete sentences. Simply pull out the chemical formulas.

For example:
Solutions of silver nitrate and magnesium iodide are combined. This is a double replacement reaction. $2AgNO_3(aq)$ + $MgI_2(aq) \rightarrow 2AgI(s) + Mg(NO_3)_2(aq)$

1. Ammonium sulfate reacts with barium nitrate.

2. Zinc metal is added to a solution of copper (II) chloride.

3. Propane gas (C_3H_8) is burned in excess oxygen.

4. Perchloric acid reacts with cadmium to form cadmium perchlorate and a gas.

5. Magnesium and nitrogen gas are heated together.

6. Chlorine gas is bubbled through a solution of sodium bromide.

7. Solutions of lead nitrate and calcium iodide are combined.

8. Sulfuric acid is combined with sodium hydroxide.

9. Isopropyl alcohol (C_3H_7OH) is burned in oxygen.

10. Iron metal shavings are added to hydrochloric acid.

11. Solid sodium carbonate is heated in a crucible.

12. Sodium metal is added to distilled water.

13. Zinc carbonate can be heated to form zinc oxide and carbon dioxide

14. On treatment with hydrofluoric acid, silicon dioxide forms silicon tetrafluoride and water.

15. Sulfur dioxide reacts with water to form sulfurous acid.

16. Liquid butane fuel (C_4H_{10}) burns in the presence of oxygen gas.

17. A solution of sodium bromide reacts with a solution of vanadium (III) nitrate to form a brightly colored precipitate.

Name ________________________________

Worksheet #5
The Mole

For each problem below, show your work. Always use units and box in your final answer.

1. Determine the molar mass of each of the following compounds:

   a) N_2O_5

   b) $FeCO_3$

   c) $Ca(C_2H_3O_2)_2$

   d) $(NH_4)_3PO_4$

   e) sodium nitrate

   f) copper (II) sulfate

   g) disilicon hexabromide

2. The molecular formula of aspartame, the artificial sweetener marketed as NutraSweet, is $C_{14}H_{18}N_2O_5$.

   a) What is the molar mass of aspartame?

   b) How many moles of aspartame are present in 1.00 mg of aspartame? (1000 mg = 1g)

   c) How many molecules of aspartame are present in 1.00 mg of aspartame?

   d) How many hydrogen atoms are present in 1.00 mg of aspartame?

3. A sample of glucose, $C_6H_{12}O_6$, contains 2.03 x 10^{21} atoms of carbon.
   a) How many atoms of hydrogen does it contain?

   b) How many molecules of glucose does it contain?

   c) How many moles of glucose does it contain?

   d) What is the mass of the sample in grams?

4. Calculate the following amounts:
   a) How many moles of chloride ions are in 0.0750 g of magnesium chloride?

   b) What is the mass, in grams, of 3.50 x 10^{-3} mol of aluminum sulfate?

   c) What is the mass, in grams, of 1.75 x 10^{20} molecules of caffeine, $C_8H_{10}N_4O_2$?

   d) What is the molar mass of cholesterol if 0.00105 mol weigh 0.406 g?

5. Calculate the number of molecules in:
    a) 0.0666 mol propane, C_3H_8, a hydrocarbon fuel

    b) A 50.0 mg tablet of acetaminophen, $C_8H_9O_2N$, an analgesic solid under the name of Tylenol

    c) A tablespoon of table sugar, $C_{12}H_{22}O_{11}$, weighing 10.5 g

6. The allowable concentration level of vinyl chloride, C_2H_3Cl, in the atmosphere in a chemical plant is 2.0×10^{-6} g/L.
    a) How many moles of vinyl chloride in each liter does this represent?

    b) How many molecules per liter is this?

Name ___________________________

Worksheet #6
Empirical and Molecular Formulas

For each problem below, show your work. Always use units and box in your final answer.

1. Determine the empirical formula of each of the following compounds if a sample contains
    a. 0.104 mol K, 0.052 mol C, and 0.156 mol O

    b. 5.28g Sn and 3.37g F

    c. 87.5 percent N and 12.5 percent H by mass

2. Determine the empirical formulas of the compounds with the following compositions by mass
    a. 10.4% C, 27.8% S, and 61.7% Cl

    b. 21.7% C, 9.6% O, and 68.7%

3. 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

4. Determine the empirical and molecular formulas of each of the following substances:
    a. Ibuprofen, a headache remedy, contains 75.69% C, 8.80% H, and 15.51% O by mass; the molar mass is about 206 g.

    b. Benzene contains only carbon and hydrogen and is 7.74% hydrogen by mass. The molar mass of benzene is 78.1 g/mol.

5. Many homes in rural America are heated by propane gas, a compound that contains only carbon and hydrogen. Complete combustion of a sample of propane produced 2.641 g of carbon dioxide and 1.442 g of water as the only products. Find the empirical formula of propane. (Hint: Figure out how many moles of C and H were produced. They all came from the fuel.)

6. (This is probably the hardest problem in the whole packet!) Menthol, the substance we can smell in mentholated cough drops, is composed of C, H, and O. A 0.1005 g sample of menthol is combusted, producing 0.2829 g of CO_2 and 0.1159 g of H_2O.
    a. What is the empirical formula for menthol?

    b. If the compound has a molar mass of 156 g/mol, what is its molecular formula

Name ___________________________

Worksheet #7
Stoichiometry Problems

For each problem below, show your work. Always use units and box in your final answer.

1) Why is it essential to use balanced chemical equations in solving stoichiometry problems?

2) 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?

3) 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?

4) Calcium carbonate decomposes upon heating, producing calcium oxide and carbon dioxide gas.
   a. Write a balanced chemical equation for this reaction.

   b. How many grams of calcium oxide will be produced after 12.25 g of calcium carbonate is completely decomposed?

   c. What volume of carbon dioxide gas is produced from this amount of calcium carbonate, at STP?

5. Hydrogen gas and bromine gas react to form hydrogen bromide gas.

d. Write a balanced chemical equation for this reaction.

e. 3.2 g of hydrogen gas and 9.5 g of bromine gas react. Which is the limiting reagent?

f. How many grams of hydrogen bromide gas can be produced using the amounts in (b)?

g. How many grams of the excess reactant is left unreacted?

h. What volume of HBr, measured at STP, is produced in (b)?

6. When ammonia gas, oxygen gas and methane gas (CH_4) are combined, the products are hydrogen cyanide gas and water.

7. Write a balanced chemical equation for this reaction.

8. Calculate the mass of each product produced when 225 g of oxygen gas is reacted with an excess of the other two reactants.

9. If the actual yield of the experiment in (b) is 105 g of HCN, calculate the percent yield.

10. When solutions of potassium iodide and lead (II) nitrate are combined, the products are potassium nitrate and lead (II) iodide.

11. Write a balanced equation for this reaction, including (aq) and (s).

12. Calculate the mass of precipitate produced when 50.0mL of 0.45M potassium iodide solution and 75mL of 0.55M lead (II) nitrate solution are mixed.

13. Calculate the volume of 0.50M potassium iodide required to react completely with 50.0mL of 0.50M lead (II) nitrate

Name ___________________________

Worksheet #8
Limiting Reactants and Theoretical Yield

For each problem below, show your work. Always use units and box in your final answer.

1. A manufacturer of bicycles has 50 wheels, 30 frames, and 24 seats.
   a. How many bicycles can be manufactured using these parts?

   b. How many parts of each kind are left over?

   c. Which part is like a limiting reactant in that it limits the production of bicycles?

2. The fizz produced when an Alka-Seltzer tablet is dissolved in water is due to the reaction between sodium bicarbonate, $NaHCO_3$, and citric acid, $H_3C_6H_5O_7$:

$$3\ NaHCO_3\,(aq) + H_3C_6H_5O_7\,(aq) \dashrightarrow 3\ CO_2\,(g) + 3\ H_2O(l) + Na_3C_6H_5O_7\,(aq)$$

   In a certain experiment 1.00 g of sodium bicarbonate and 1.00 g of citric acid are allowed to react.
   a. Which reactant is the limiting reactant? You must show work to support your answer.

   b. How many grams of carbon dioxide form?

   c. How much of the limiting reactant is left when the reaction is complete?

   d. How much of the excess reactant remains after the reaction is complete?

3. When hydrogen sulfide gas is bubbled into a solution of sodium hydroxide, the reaction forms sodium sulfide and water. How many grams of sodium sulfide are formed if 2.50 g of hydrogen sulfide is bubbled into a solution containing 1.85 g of sodium hydroxide, assuming that the limiting reagent is completely consumed?

4. Solutions of sulfuric acid and lead (II) acetate react to form solid lead (II) sulfate and a solution of acetic acid. If 10.0 g of sulfuric acid and 10.0 g of lead (II) acetate are mixed, calculate the number of grams of sulfuric acid, lead (II) acetate, lead (II) sulfate, and acetic acid present in the mixture after the reaction is complete.

5. A student reacts benzene, C_6H_6, with bromine, Br_2, to prepare bromobenzene, C_6H_5Br, and HBr.

    a. What is the theoretical yield of bromobenzene in this reaction when 30.0 g of benzene reacts with 65.0 g of bromine?

    b. If the actual yield of bromobenzene was 56.7 g, what was the percent yield?

6. A student reacts benzene, C_6H_6, with bromine, Br_2, to prepare bromobenzene, C_6H_5Br, and HBr.

   a. What is the theoretical yield of bromobenzene in this reaction when 30.0 g of benzene reacts with 65.0 g of bromine?

   b. If the actual yield of bromobenzene was 56.7 g, what was the percent yield?

Name ________________________________

Worksheet #9 Solubility Rules

Review Solubility Rules provided at the beginning of the packet and identify each of the following compounds as soluble or insoluble in water. You must memorize the solubility rules!

Na_2CO_3 ____________	$CoCO_3$ __________________	$Pb(NO_3)_2$ _______________
K_2S _________________	$BaSO_4$ __________________	$(NH_4)_2S$ ________________
AgI _________________	$Ni(NO_3)_2$ ________________	KI _____________________
FeS _________________	$PbCl_2$ ___________________	$CuSO_4$ _________________
Li2O ________________	$Mn(C_2H_3O_2)_2$ ___________	$Cr(OH)_3$_________________
AgClO3 ____________	$Sn(SO_3)_4$ ________________	FeF_2 ____________________

1) Circle the compounds from the list below which are insoluble in water

HCl, NH_3, $NaClO_3$, $BaSO_4$, $AgNO_3$, $PbCl_2$, Cu_2O, $CuSO_4$, $Pb(C_2H_3O_2)$, $AgBr$

Name ____

Worksheet #10 Average Atomic Mass
Worksheet: show all work.

1) Rubidium is a soft, silvery-white metal that has two common isotopes, ^{85}Rb and ^{87}Rb. If the abundance of ^{85}Rb is 72.2% and the abundance of ^{87}Rb is 27.8%, what is the average atomic mass of rubidium?

2) Uranium is used in nuclear reactors and is a rare element on earth. Uranium has three common isotopes. If the abundance of ^{234}U is 0.01%, the abundance of ^{235}U is 0.71%, and the abundance of ^{238}U is 99.28%, what is the average atomic mass of uranium?

3) Titanium has five common isotopes: ^{46}Ti (8.0%), ^{47}Ti (7.8%), ^{48}Ti (73.4%), 49Ti (5.5%), 50 Ti (5.3%). What is the average atomic mass of titanium?

4) Why is the mass in amu of a carbon-12 atom reported as 12.011 in the periodic table of the elements?

5) Naturally occurring chlorine that is put in pools is 75.53 percent ^{35}Cl (mass = 34.969 amu) and 24.47 percent ^{37}Cl (mass = 36.966 amu). Calculate the average atomic mass.

6) Copper used in electric wires comes in two flavors (isotopes): ^{63}Cu and ^{65}Cu. ^{63}Cu has an atomic mass of 62.9298 amu and an abundance of 69.09%. The other isotope, ^{65}Cu, has an abundance of 30.91%. The average atomic mass between these two isotopes is 63.546 amu. Calculate the actual atomic mass of ^{65}Cu.

7) Magnesium consists of three naturally occurring isotopes. The percent abundance of these isotopes is as follows: ^{24}Mg (78.70%), ^{25}Mg (10.13%), and ^{26}Mg (11.7%). The average atomic mass of the three isotopes is 24.3050 amu. If the atomic mass of ^{25}Mg is 24.98584 amu, and ^{26}Mg is 25.98259 amu, calculate the actual atomic mass of ^{24}Mg.

8) Complete the table

Isotope	**Mass (amu)**	**Relative Abundance (%)**
Neon-20	19.992	90.51
Neon-21	20.994	
Neon-22		9.22
	Avg. Atomic Mass =	**Total %:**