2025-2026 AP Chemistry Summer Assignment

As part of your AP Chemistry course, you are expected to prepare for the course over the summer. You will need to memorize the following information before the course begins in the fall. While you will not be submitting any physical work, **you should be ready for a quiz on this information in the first days of school.** If you have any questions about this assignment, please email Mrs. Riemenschneider (christina.riemenschneider@cobbk12.org) for clarifications.

1. **Memorize the following:**
    a. **Common Symbols from the Periodic Table of Elements**
    The AP Chemistry periodic table does not contain any element names, only symbols. You must be able to recognize these common element symbols. Bold items are anomalous names.
    Helpful Quizlet: https://quizlet.com/_6illr7?x=1jqt&i=vnwa9
    b. **Name and Symbols of Metal Cations and Polyatomic Ions**
    Memorize the **name**, **chemical formula**, and **charge(s)** of the common ions listed in the two tables provided below. Both tables must be memorized.
    Helpful Quizlet: https://quizlet.com/_6illvh?x=1jqt&i=vnwa9

2. **Be able to name and write formulas for ionic compounds, covalent compounds, and acids.**
    You will frequently see the names for compounds and knowing their formula is imperative for understanding. Use the flowchart attached to help you determine how to name and write formulas. A flow chart is only one way of presenting this information, can you use a third study method to present it another way?
    Helpful Quizlet: https://quizlet.com/_9v0v0w?x=1qqt&i=vnwa9

3. **Complete the practice worksheet attached.**
    This worksheet contains practice problems that will prepare you for your first quiz. It includes material listed above as well as review questions on skills most commonly seen in AP Chemistry. Your answers to all calculation questions should include correct units. You will turn this in during the first week of school

What to expect on the first quiz:

The quiz is NOT multiple choice. Be prepared to show work and explain answers.

- Given an element's symbol or chemical formula, provide the element or formula's name and vice versa.
- Given a polyatomic ion, provide its chemical formula (including charge) and vice versa.
- Be able to name ionic and covalent formulas, including acids.
- Complete basic stoichiometry problems and answer questions using appropriate significant figures.

Final Note: Class Materials

You will need a binder with dividers and paper for this class. You will also need a scientific calculator. While a graphing calculator is nice, they are expensive. A TI-30XS, or equivalent, will be appropriate. It needs to be able to do logarithmic calculations. If any of these purchases place an undue financial burden on your family, let Mrs. Riemenschneider know.

Common Symbols from the Periodic Table of Elements

aluminum Al	chromium Cr	**lead Pb**	radon Rn
antimony Sb	cobalt Co	lithium Li	rubidium Rb
argon Ar	**copper Cu**	magnesium Mg	selenium Se
arsenic As	fluorine F	manganese Mn	silicon Si
barium Ba	francium Fr	**mercury Hg**	**silver Ag**
beryllium Be	gallium Ga	neon Ne	**sodium Na**
bismuth Bi	germanium Ge	nickel Ni	strontium Sr
boron B	**gold Au**	nitrogen N	sulfur S
bromine Br	helium He	oxygen O	**tin Sn**
calcium Ca	hydrogen H	phosphorus P	**tungsten W**
carbon C	iodine I	platinum Pt	uranium U
cesium Cs	**iron Fe**	**potassium K**	xenon Xe
chlorine Cl	krypton Kr	radium Ra	zinc Zn

Metal Cations

Sb^{+3} Antimony(III)	Pb^{+2} Lead(II)
Sb^{+5} Antimony(V)	Pb^{+4} Lead(IV)
Bi^{+3} Bismuth(III)	Mn^{+2} Manganese(II)
Bi^{+5} Bismuth(V)	Mn^{+3} Manganese(III)
Cd^{+2} Cadmium	Mn^{+4} Manganese(IV)
Cr^{+2} Chromium(II)	Mn^{+7} Manganese(VII)
Cr^{+3} Chromium(III)	Hg_2^{+2} Mercury(I)
Co^{+2} Cobalt(II)	Hg^{+2} Mercury(II)
Co^{+3} Cobalt(III)	Ni^{+2} Nickel(II)
Cu^{+1} Copper(I)	Ni^{+3} Nickel(III)
Cu^{+2} Copper(II)	Ag^{+1} Silver
Au^{+1} Gold(I)	Sn^{+2} Tin(II)
Au^{+3} Gold(III)	Sn^{+4} Tin(IV)
Fe^{+2} Iron(II)	Zn^{+2} Zinc
Fe^{+3} Iron(III)	

Common Polyatomic Ions

monovalent polyatomic cations (+1 charge):

H_3O^+	hydronium
NH_4^+	ammonium

monovalent polyatomic anions (-1 charge):

BrO_4^-	perbromate
BrO_3^-	bromate
BrO_2^-	bromite
BrO^-	hypobromite
ClO_4^-	perchlorate
ClO_3^-	chlorate
ClO_2^-	chlorite
ClO^-	hypochlorite
IO_4^-	periodate
IO_3^-	iodate
IO_2^-	iodite
IO^-	hypoiodite
MnO_4^-	permanganate
MnO_3^-	manganate
NO_3^-	nitrate
NO_2^-	nitrite
$C_2H_3O_2^-$	acetate
CH_3COO^-	acetate
CN^-	cyanide
OCN^-	cyanate
SCN^-	thiocyanate
OH^-	hydroxide
N_3^-	azide
NH_2^-	amide
O_2^-	superoxide

divalent polyatomic anions (-2 charge):

CrO_4^{-2}	chromate
$Cr_2O_7^{-2}$	dichromate
SO_4^{-2}	sulfate
SO_3^{-2}	sulfite
$S_2O_3^{-2}$	thiosulfate
CO_3^{-2}	carbonate
$C_2O_4^{-2}$	oxalate
O_2^{-2}	peroxide

tri and tetravalent anions (-3/-4 charge):

BO_3^{-3}	borate
PO_3^{-3}	phosphite
PO_4^{-3}	phosphate
AsO_4^{-3}	arsenate
AsO_3^{-3}	arsenite

polyatomic anions containing hydrogen:

HCO_3^-	hydrogen carbonate (aka bicarbonate)
HSO_4^-	hydrogen sulfate (aka bisulfate)
HSO_3^-	hydrogen sulfite (aka bisulfite)
HPO_4^{-2}	hydrogen phosphate
$H_2PO_4^-$	dihydrogen phosphate
HS^-	hydrogen sulfide

LOOK ON BACK FOR EXAMPLES OF EACH!

Naming Compounds Flowchart

Is there a METAL in the compound?

YES

Is the METAL a TRANSITION METAL?

NO

Count the different elements

- **2** elements — *Metal / Nonmetal* — **Ionic Binary**
  - **Name metal first**
  - **Name nonmetal second *and* change ending to** "-ide"
- **3 or more** elements — *Metal / Poly Ion* — **Ionic Ternary**
  - **Name metal first**
  - **Name polyatomic ion second**
  - ***DO NOT*** **change ending to** "-ide"

YES

Count the different elements

- **2** elements — *Tran Metal / Nonmetal* — **Ionic Binary**
  - **Name transition metal first**
  - *Determine charge of transition metal and write as Roman Numeral after name*
  - **Name nonmetal second and change ending to** "-ide"
- **3 or more** elements — *Tran Metal / Poly Ion* — **Ionic Ternary**
  - **Name transition metal first**
  - *Determine charge of transition metal and write as Roman Numeral after name*
  - **Name polyatomic ion second**
  - ***DO NOT*** **change ending to** "-ide"

NO

Is the first element Hydrogen?

YES

Acid

H + Element
Hydro + *root anion* + **-ic acid**

H + Polyatomic ion
- **Poly ion ending in *–ate***
  Root anion + **-ic acid**
- **Poly ion ending in *–ite***
  Root anion + **-ous acid**

Root anion *= 1st part of polyatomic ion name or element*

NO

Count the different elements

- **1** element — **Diatomic molecule**
  - Br_2 I_2 N_2 Cl_2 H_2 O_2 F_2
  - **Name the element**
- **2** elements — **Covalent Binary**
  - **Name first element, using prefixes** (*except* "mono-")
    (Prefixes indicate how many of each element is in the compound)
  - **Name second element, using prefixes** (*including* "mono-")
  - **Change ending to** "-ide"

AP Chemistry Summer Assignment Practice Worksheet

Part 1: Naming and Writing Formulas

Antimony tribromide _____

Lithium oxide _____

Tin (II) hydroxide _____

B_2Si _____

Iron (III) phosphide _____

Hydrogen iodide _____

$Zn_3(PO_4)_2$ _____

Dinitrogen trioxide _____

Sodium hydroxide _____

$Cu(CH_3\ COO)_2$ _____

Si_2Br_6 _____

Phosphorus triiodide _____

Aluminum sulfide _____

P_4S_5 _____

chlorine dioxide _____

NF_3 _____

Cobalt (III) carbonate _____

SeF_6 _____

$Be(NO_3)_2$ _____

$Na_2(SO_3)$ _____

Iodine pentafluoride _____

Hexaboron silicide _____

$Cu(HCO_3)_2$ _____

CH_4 _____

Fill in the symbols and charges of the ions and then write the correct chemical formulas and the chemical names in the corresponding blocks. The first one is done for you.

IONS	Sodium Na^+	Calcium	Aluminum	Ammonium	Hydrogen
Chloride Cl^-	NaCl Sodium chloride				
Nitrate					
Oxide					
Sulfide					
Phosphate					
Iodide					

Part 2: Stoichiometry Review

1. How many grams are in a 2.8 mol sample of iron?

2. Given the equation: $2\ K + Cl_2 \rightarrow 2\ KCl$
   How many grams of KCl are produced from 1.00 g of Cl_2 and excess K?

3. What is the percent composition by mass of each element in $Ca_3(PO_4)_2$?

4. The following reaction occurs: $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$
   a. How many grams of AgCl result from the reaction of 1.30 g of NaCl and 3.5 g of $AgNO_3$?

   b. Identify the limiting reactant and the excess reactant.

   c. How much of the excess reactant is left over?

   d. If the reaction actually yielded 2.7g, what is the percent yield and the percent error for the reaction?

5. What is the empirical formula of xircon if its percent composition by mass is 34.91% O, 15.32% Si, and 49.76% Zr?

6. How many atoms of Aluminum are in a 63 g sample of Al_2O_3?

7. Calculate the number of moles of O_2 gas present in a sample that contains 4.00×10^{29} molecules.