## AP Chemistry Summer Assignment 2015-2016

## What are the skills and knowledge that I need to be competent in for the beginning of this course?

- Nomenclature
  - Ionic Compounds
    - Learn the charges of the monoatomic ions and how to assign charges based on location on the periodic table
    - Learn the list of polyatomic ions
    - Name ionic compounds from formulas
    - Write chemical formulas from names
  - Covalent (Molecular) Compounds
    - Learn the diatomic and polyatomic elements
  - Acidic Compounds
- Reactions
  - Predict the products of a reaction if given the names of the reactants
  - Balance the complete equation
  - Learn the solubility rules
  - Use solubility rules to identify the solid precipitates from double displacement reactions

## Molar Quantities

- Calculate molar mass of an element and compound
- Use mole conversions to convert between grams, moles, particles, and volume of a gas at STP of a single compound
- Use mole conversions and mole ratio to convert between grams, moles, particles, and volume of a gas at STP for compounds within a balanced equation

# <u>Here are the quizzes you will take when you</u> <u>come back to school</u>

2<sup>nd</sup> Day of Class (Tuesday August 4<sup>th</sup>)→
 Writing Chemical formulas Quiz → You will be given a series of chemical names (may include polyatomics) and asked to write their formulas (you will not be allowed to use any notes or your polyatomic ion sheet)

- 4<sup>th</sup> Day of Class (Thursday August 6<sup>th</sup>)→
   Predicting, balancing, and identifying the precipitate of double replacement reactions Quiz → you will be given a series of word and symbolic equations and will need to predict the products, balance the equation, and identify the precipitate using the solubility rules (you will not be allowed to use any notes or the solubility rules, you must know them)
- 6<sup>th</sup> Day of Class (Monday August 10<sup>th</sup>)→
   Molar Quantities Quiz → you will be expected to calculate molar mass, perform mole conversions, and stoichiometry calculations for given problems

# How do I go about reminding myself of how to do these things?

- Visit Mrs. Portwood's classroom website <u>http://bit.ly/1zOnPQf</u>.
  - Look on the left hand side of the page for Summer Assignment under AP Chemistry. There will be a variety of resources posted here including podcasts, links to tutorials, etc for each portion of the summer assignment.
- Visit YouTube
  - Mrs. Portwood has a channel: MrsPortwoodsClass , there are lots of podcasts here.
  - Crash Course Chemistry has lots of chemistry tutorial videos <u>http://bit.ly/Xw10Dt</u>
  - That Chem Guy also has lots of tutorials <u>http://bit.ly/1EYjdGs</u>
- Khan Academy has lots of videos too
- Chem Tutor has a collection of resources and tutorials <u>http://www.chemtutor.com/</u>
- Email Mrs. Portwood @ <u>LPortwood@paulding.k12.ga.us</u> or <u>lyricshea97@bellsouth.net</u> with questions

## I. Nomenclature (Quiz 1)

There are three classifications of compounds/molecules that you must be able to name and determine the formula for in this class. Each type of compound requires you name them according to different sets of rules. Therefore you must be able to tell them apart.

		1	
	Ionic	Covalent	Acidic
•	Metal and nonmetal	<ul> <li>Two or more nonmetals</li> </ul>	Special kind of ionic
•	Can but does not have to have		compound where hydrogen
	a polyatomic ion in it		(H) is always the cation (first
			element in compound)

\* A periodic table that is color-coded according to Metals and Nonmetals can be found here. http://bit.ly/1IoMoXf

#### a. Ionic Compounds

- i. Learn the charges of the monoatomic ions and how to assign charges based on location on the periodic table
  - 1. Remember the rhyme. 1 plus, 2 plus, 3 plus, skip, 3 minus, 2 minus, 1 minus, zip
  - 2. A periodic table example can be found here. <u>http://bit.ly/1zOvMFd</u>
- ii. Learn the list of polyatomic ions The following polyatomics follow a pattern based on their number of oxygen atoms

Greatest number	1 less oxygen atom;	2 less oxygen atoms;	3 less oxygen atoms;
of oxygen atoms;	ate	ite	Hypoite
Perate			
Perchlorate	Chlor <b>ate</b>	Chlori <b>te</b>	Hypochlorite
CIO4 <sup>1-</sup>	CIO <sub>3</sub> <sup>1-</sup>	CIO2 <sup>1-</sup>	CIO <sup>1-</sup>
<b>Per</b> iod <b>ate</b>	Iod <b>ate</b>	Iodi <b>te</b>	Hypoiodite
IO4 <sup>1-</sup>	IO <sub>3</sub> <sup>1-</sup>	IO <sub>2</sub> <sup>1-</sup>	IO <sup>1-</sup>
<b>Per</b> brom <b>ate</b>	Brom <b>ate</b>	Bromi <b>te</b>	Hypobromite
BrO4 <sup>1-</sup>	NO <sub>3</sub> <sup>1-</sup>	BrO <sub>2</sub> <sup>1-</sup>	BrO <sup>1-</sup>
	Nitr <b>ate</b>	Nitr <b>ite</b>	
	NO3 <sup>1-</sup>	NO2 <sup>1-</sup>	
	Sulf <b>ate</b>	Sulf <b>ite</b>	
	504 <sup>2-</sup>	SO <sub>3</sub> <sup>1-</sup>	
	Bisulf <b>ate</b>	Bisulf <b>ite</b>	
	HSO4 <sup>1-</sup>	HSO3 <sup>1-</sup>	
	Phosph <b>ate</b>	Phosphi <b>te</b>	
	PO4 <sup>3-</sup>	PO3 <sup>3-</sup>	
	Carbon <b>ate</b>		-
	CO3 <sup>2-</sup>		
	Chrom <b>ate</b>		
	CrO <sub>4</sub> <sup>2-</sup>		
	Thiosulf <b>ate</b>		
	S <sub>2</sub> O <sub>3</sub> <sup>2-</sup>		
	Silicate		
	SiO <sub>3</sub> <sup>2-</sup>		

1+	1 -	2-
Ammonium	Bicarbonate	Dichromate
$NH_4^{1+}$	HCO <sub>3</sub> <sup>1-</sup>	$Cr_2O_7^{2-}$
Hydronium	Acetate	Thiocyanate
H₃O¹⁺	$C_2H_3O_2^{1-}$	S <sub>2</sub> O <sub>3</sub> <sup>2-</sup>
	Cyanide	Peroxide
	CN <sup>1-</sup>	O <sub>2</sub> <sup>2-</sup>
	Permanganate	Oxalate
	MnO4 <sup>1-</sup>	$C_2 O_4^{2-}$
	Hydroxide	
	OH¹⁻	

These are other polyatomic ions you need to know

iii. Name ionic compounds from formulas



\* Multivalent ions are found in the middle portion and skip (carbon) column of the periodic table. Note that there are two elements that are in the middle of the table that do not require a roman numeral because they are always the same charge: silver, Ag<sup>1+</sup> and Zinc Zn<sup>2+</sup>

\*\*When encountering positive polyatomic ions hydronium and ammonium, name these polyatomics then use binary rules if anion (negative ion) is just an element and tertiary rules if anion is a polyatomic

- iv. Write chemical formulas from names
  - 1. Use must use the swap and drop method. Write positive ion first then negative ion.
  - 2. Assign charges for cation and anion.

3. Swap and drop charges so that they become subscripts. Cancel charges that are opposite in charge but equivalent in value.

#### b. Covalent (Molecular) Compounds

i. Learn the diatomic and polyatomic elements

Diatomic element	Polyatomic element
H <sub>2</sub>	S <sub>8</sub>
N <sub>2</sub>	O3 (ozone)
O <sub>2</sub>	P <sub>4</sub>
F <sub>2</sub>	
Cl <sub>2</sub>	
Br <sub>2</sub>	
I <sub>2</sub>	

ii. Name covalent molecules

1. Use prefixes below to indicate the number of each element (exception  $\rightarrow$  never use mono- on first element).

- 2. Change ending of last element to -ide.
  - Ex.  $CO_2 \rightarrow$  carbon dioxide
  - $H_2O \rightarrow dihydrogen monoxide$
- c. Acidic Compounds

## <u>Binary Acids</u> (no oxygen)

- Prefix is Hydro-
- Suffix is -ic
- Stem: derived from element that combines with hydrogen:
- Ex. HBr  $\rightarrow$  hydrobromic acid
- $H_2S \rightarrow$  hydrosulfuric acid
- $HF \rightarrow hydrofluoric acid$

## <u>Tertiary Acids</u> (contains oxygen)

- Name is determined by the polyatomic anion:
- -ate endings change to -ic,
   -ite endings change to -ous.

Ex. HClO  $\rightarrow$  hypochlorous acid

 $HClO_4 \rightarrow perchloric acid$ 

 $HIO_3 \rightarrow iodic acid$ 

 $H_2SO_3 \rightarrow sulfurous acid$ 

1. Name these compounds.

a)	IF <sub>7</sub>	o)	CuCr <sub>2</sub> O <sub>7</sub>
b)	N <sub>2</sub> O <sub>5</sub>	p)	KI
c)	XeF	q)	SrBr <sub>2</sub>
d)	NaOH	r)	Na <sub>2</sub> S
e)	N <sub>2</sub> O <sub>4</sub>	s)	$H_2^{CrO_4}$
f)	As <sub>4</sub> O <sub>10</sub>	†)	CaF <sub>2</sub>
g)	SF <sub>6</sub>	u)	CuCl <sub>2</sub>
h)	H <sub>3</sub> PO <sub>4</sub>	v)	Fe <sub>2</sub> O3
i)	PCl <sub>3</sub>	w)	SnO
j)	S <sub>2</sub> Cl <sub>2</sub>	x)	PbCl <sub>4</sub>
k)	LiMnO	y)	Cu <sub>2</sub> S
I)	AICI	z)	HgS
m)	MaO	aa)	AuI <sub>3</sub>
n)	BaI	bb)	СоР
	2	cc)	NI <sub>3</sub>

- 2. Write the formulas.
  - a) Tin (IV) phosphide
  - b) copper (II) cyanide
  - c) Magnesium hydroxide
  - d) sodium peroxide
  - e) Sulfurous acid
  - f) lithium silicate
  - g) Potassium nitride
  - h) chromium (III) carbonate
  - i) Gallium arsenide
  - j) cobalt (II) chromate
  - k) Zinc fluoride
  - I) dichromic acid
  - m) Barium sulfate
  - n) Ammonium chloride
  - o) Chlorine monoxide
  - p) Silicone tetrachloride
  - q) Magnesium fluoride
  - r) Sodium oxide
  - s) Sodium peroxide
  - t) Copper (I) iodide
  - u) Zinc sulfide

dd)	$Fe(NO_3)_3$	rr)	СО
ee)	Cu <sub>2</sub> SO <sub>4</sub>	ss)	NH <sub>4</sub> CN
ff)	$Ca(ClO_3)_2$	<del>†</del> †)	$HIO_3$
gg)	KNO <sub>2</sub>	uu)	Al <sub>2</sub> O <sub>3</sub>
hh)	NaHCO3	vv)	AIP
ii)	NH,NO	ww)	OF <sub>2</sub>
jj) kk) II) mm) nn) oo) pp)	$Cu_{2}Cr_{2}O_{7}$ HCl HI HClO <sub>4</sub> H_{2}SO_{4} HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub> HNO <sub>2</sub>	xx) yy) zz) aaa) bbb) ccc) ddd)	HCIO HF $SO_2 K_2O$ $H_2CO_3$ )FeF $_3$ $KC_2H_3O_2$ )MnS
qq)	H <sub>2</sub> C <sub>2</sub> O <sub>4</sub>		

- v) Potassium carbonate
- w) Hydrobromic acid
- x) Perbromic acid
- y) Lead (II) acetate
- z) Sodium permanganate
- aa) Lithium oxalate
- bb) Potassium cyanide
- cc) Iron (III) hydroxide

## II. Reactions (Quiz 2)

- a. Predict the products of a reaction if given the names of the reactants
  - 1. Switch the fronts of both compounds in a double replacement reaction.

2. Then you will need to assign charges to the cations and anions in the new compounds just made.

3. Swap and drop these charges to subscripts to get the new formulas

b. Balance the complete equation

Everyone should keep in practice when it comes to balancing equations. If you don't see coefficients in front of compounds you should check the balancing. Here are two web sites that will help you practice.

- http://science.widener.edu/svb/tutorial/rxnbalancingcsn7.html
- <u>http://www.chemistry-drills.com/balance.html</u>
- A lower level site for practice is http://funbasedlearning.com/chemistry/chemBalancer/default.htm
- c. Learn the solubility rules

These rules are not all inclusive. Rather they provide you with enough info to determine solubility of most compounds. You can look up specifics if you run into a situation with a different anion that is not covered in these rules.

## Solubility Rules

- 1. All compounds containing alkali metal cations and the ammonium ion are soluble.
- 2. All compounds containing  $NO_3^-$ ,  $CIO_4^-$ ,  $CIO_3^-$ , and  $C_2H_3O_2^-$  anions are soluble.
- 3. All chlorides, bromides, and iodides are soluble except those containing Ag<sup>+</sup>, Pb<sup>2+</sup>, or Hg<sup>2+</sup>.
- 4. All sulfates are soluble except those containing Hg<sup>2+</sup>. Pb<sup>2+</sup>, Sr<sup>2+</sup>, Ca<sup>2+</sup>, or Ba<sup>2+</sup>.
- 5. All hydroxides are insoluble except those compounds of the alkali metals, Ca<sup>2+</sup>, Sr<sup>2+</sup>, and Ba<sup>2+.</sup>
- 6. All compounds containing  $PO_4^{3-}$ ,  $S^{2-}$ ,  $CO_3^{2-}$ , and  $SO_3^{2-}$  ions are insoluble except those that contain alkali metals or  $NH_4^+$ .

\*Soluble = dissolves in water, (aq) \*\*Insoluble = does not dissolve in water, (s), precipitate

d. Use solubility rules to identify the solid precipitates from double displacement reactions.

Ex. If 10.0ml of 0.20M Calcium nitrate is combined with 10.0ml of 0.20M aluminum hydroxide, what precipitate forms?

 $3Ca(NO_3)_2 + 2Al(OH)_3 \rightarrow \underline{3Ca(OH)_2(s)} + 2Al(NO_3)_3$ , calcium hydroxide is the precipitate formed

## Practice for Quiz 2

I. Using the solubility rules, identify each of the following compounds as soluble (S) or insoluble (I) in water. You must memorize the solubility rules given in this packet.

a)	Na <sub>2</sub> CO <sub>3</sub>	g)	AgI	m)	Li₂O
b)	CoCO <sub>3</sub>	h)	Ni(NO <sub>3</sub> ) <sub>2</sub>	n)	$Mn(C_2H_3O_2)_2$
c)	Pb(NO <sub>3</sub> ) <sub>2</sub>	i)	KI	o)	Cr(OH)₃
d)	K <sub>2</sub> S	j)	FeS	p)	AgClO₃
e)	BaSO <sub>4</sub>	k)	PbCl <sub>2</sub>	q)	$Sn(SO_3)_4$
f)	(NH4)₂S	I)	CuSO4	r)	FeF2

II. Balance the following equations with the lowest whole number coefficients.

a) \_\_\_\_\_S<sub>8</sub> + \_\_\_\_  $\rightarrow O_2$  \_\_\_\_\_SO<sub>3</sub> b) \_\_\_\_\_C<sub>10</sub>H<sub>16</sub> + \_\_\_\_\_Cl<sub>2</sub>  $\rightarrow$  \_\_\_\_\_C + \_\_\_\_HCl c) \_\_\_\_Fe + \_\_\_\_O<sub>2</sub>  $\rightarrow$  \_\_\_\_\_Fe<sub>2</sub>O<sub>3</sub> d) \_\_\_\_\_C<sub>7</sub>H<sub>6</sub>O<sub>2</sub> + \_\_\_\_O<sub>2</sub>  $\rightarrow$  \_\_\_\_CO<sub>2</sub> + \_\_\_\_\_H<sub>2</sub>O e) \_\_\_\_\_KClO<sub>3</sub>  $\rightarrow$  \_\_\_\_\_KCl + \_\_\_\_O<sub>2</sub> f) \_\_\_\_\_H<sub>3</sub>AsO<sub>4</sub>  $\rightarrow$  \_\_\_\_As<sub>2</sub>O<sub>5</sub> + \_\_\_\_\_H<sub>2</sub>O g) \_\_\_\_V<sub>2</sub>O<sub>5</sub> + \_\_\_\_\_HCl  $\rightarrow$  \_\_\_\_VOCl<sub>3</sub> + \_\_\_\_\_H<sub>2</sub>O h) \_\_\_\_Hg(OH)<sub>2</sub> + \_\_\_\_\_H<sub>3</sub>PO<sub>4</sub>  $\rightarrow$  \_\_\_\_\_Hg<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> + \_\_\_\_\_H<sub>2</sub>O

III. Predict the products of each double replacement reaction. Reactants are described for eachreaction. TIP: put in the states of matter for all compounds this will reduce the chances of mistakes ie:aqueous = (aq)solid = (s)liquid = (l)gas = (g)

- a) Aqueous solutions of potassium iodide and silver nitrate are mixed
- b) An aqueous solution of ammonium phosphate is added to a solution of sodium sulfate..
- c) Aqueous solutions of aluminum chloride and sodium hydroxide are mixed.
- d) Aqueous solutions of lithium sulfate and calcium nitrate are added together.
- e) Aqueous solutions sodium carbonate and manganese (V) chloride are mixed.
- f) Lithium chromate solution is added to barium chloride
- g) Rubidium iodide solution is mixed with silver nitrate solution.
- h) 0.10M of aqueous sodium phosphate is added to 0.10M of Manganese (II) chloride

IV. Write out the balanced chemical equation for each of the following double replacement reactions. Predict whether each of these double replacement reactions will give a precipitate or not based on the solubility of the products. If yes, identify the precipitate.

- a) silver nitrate and potassium chloride
- b) magnesium nitrate and sodium carbonate
- c) strontium bromide and potassium sulfate
- d) cobalt (III) bromide and potassium sulfide
- e) ammonium hydroxide and copper (II) acetate
- f) lithium chlorate and chromium (III) fluoride

### II. Molar Quantities (Quiz 3)

a. Calculate molar mass of an element and compound

Chemistry happens in moles and the easiest way to solve problems is using moles. Since we can't directly measure the number of moles we need to take something we can measure, mass, and turn that into moles. This makes calculating molar mass (the mass in grams of a substance which contains one mole of that substance) an important first step in many problems.

All year long we will use the official AP Chemistry Periodic Table for this. A copy of the official Periodic Table is included as a separate file for download and printing. Use the complete atomic mass from the periodic table.

Example 1: NH<sub>3</sub>

 $NH_3$  is  $(1 \times N) + (3 \times H) = molar mass$ 

(1 x 14.01) + (3 x 1.008) = 17.034 which rounds to 17.03 g/mol of NH<sub>3</sub> Example 2: Ca(NO<sub>3</sub>)<sub>2</sub> Ca(NO<sub>3</sub>)<sub>2</sub> is (1 x Ca) + (2 x N) + (6 x O) = molar mass

 $(1 \times 40.08) + (2 \times 14.01) + (6 \times 16.00) = 164.1$  which becomes 164.10 g/mol of  $Ca(NO_3)_2$ 

b. Use mole conversions to convert between grams, moles, particles, and volume of a gas at STP of a single compound

The mole is a number of things (6.02  $\times$  10<sup>23</sup>) just as a dozen is a number of things (12). Because of certain relationships we can set the mole equal to three different things:

- $(6.02 \times 10^{23})$  atoms or molecules = 1 mole
- 22.4L of any gas at STP = 1 mole
- the atomic mass or molar mass in grams = 1 mole

Since all three of these quantities equal one mole we can easily convert between them. The steps always go through the mole so you can think of it as being at the center of the conversions.

Examples:

What volume does 15.0g of H<sub>2</sub> gas occupy at STP?

$$15.0g \times \frac{1 \, mol}{2.01g} \times \frac{22.4L}{1 \, mol} = 167L$$

How many molecules are in 55.0L of CO<sub>2</sub> at STP?

 $55.0L \times \frac{1 \, mol}{22.4L} \times \frac{6.02 \times 10^{23}}{1 \, mol} = 1.48 \times 10^{24} \, molecules$ 

c. Use mole conversions and mole ratio to convert between grams, moles, particles, and volume of a gas at STP for compounds within a balanced equation

These problems add an additional step of using mole ratios from the balanced equations to convert between different compounds.

## Practice for Quiz 3

I. Calculate the molar mass for each of the following:

a)	FeSO4	b)	Cu(NO <sub>3</sub> ) <sub>2</sub>	c)	$Hg_2CI_2$	d)	AgBr	e)	KClO₃	f)	MgCO₃	g)	BaO <sub>2</sub>	h)	KO <sub>2</sub>
i)	SnO <sub>2</sub>	j)	Pb(OH)₂	k)	Ni <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	I)	$CuC_2H_3O_2$	m)	$N_2O_4$	n)	Rb₃P	o)	S <sub>8</sub>	p)	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>3</sub>

q) Without doing any detailed calculations (but using the periodic table), rank the following samples in order of increasing number of atoms: 0.50 mol  $H_2O$ , 23 g Na, 6.0×10<sup>23</sup> N<sub>2</sub> molecules

#### II. Complete the following mole conversions

- a) How many grams of  $N_2\,gas$  are in 145 L at STP?
- b) What is the mass of  $4.76 \times 10^{22}$  molecules of  $H_2O$ ?
- c) How many atoms are in 35.5 L of neon at STP?
- d) What is the volume of 100.0 grams of  $Cl_2$  at STP?
- e) How many molecules of glucose,  $C_6H_{12}O_6$ , are in 55.8 grams?
- f) How many grams of  $O_2$  gas are in 34.5L at STP?
- g) What is the mass of 6.16 x  $10^{25}$  molecules of H<sub>2</sub>S?
- h) How many atoms are in 845 mL of neon at STP?
- i) What is the volume of 40.0 grams of  $F_2$  at STP?

#### III. Use stoichiometry to solve the following problems

- 1. 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:
  - $Na_2SiO_3(s) + 8HF(aq) \rightarrow H_2SiF_6(aq) + 2NaF(aq) + 3H_2O(l)$
  - a) How many moles of HF are needed to react with 0.300 mol of Na2SiO3?
  - b) How many grams of NaF form when 0.500 mol of HF reacts with excess Na2SiO3?
  - c) How many grams of Na2SiO3 can react with 0.800 g of HF?

2. Several brands of antacids use Aluminum hydroxide to react with stomach acid, which contains primarily hydrochloric acid (HCl):

$$AI(OH)_3$$
 (s) +  $3HCI$  (aq)  $\rightarrow AICI_3$ (aq) +  $3H_2O(I)$ 

a) Calculate the number of grams of HCl that can react with 0.500 g of Aluminum hydroxide

b) Calculate the number of grams of  $AICI_3$  and the number of grams of  $H_2O$  formed when 0.500 g of  $AI(OH)_3$  reacts.

c) Show that your calculations in parts (b) and (c) are consistent with the law of conservation of mass. (total mass of reactants = total mass of products)

3. Aluminum sulfide reacts with water to form aluminum hydroxide and hydrogen sulfide. How many grams of aluminum hydroxide are obtained from 14.2 g of aluminum sulfide?

$$Al_2S_3(s) + 6H_2O(l) \rightarrow 2Al(OH)_3(s) + 3H_2S(g)$$

4. Automotive air bags inflate when sodium azide, NaN<sub>3</sub>, rapidly decomposes into its elements.

$$3NaN_3 \rightarrow 4N_2 + Na_3N$$

a) How many moles of nitrogen gas (remember, it is diatomic molecule) are produced by the decomposition of 1.50 mol of sodium azide?

b) How many grams of sodium azide are required to form 10.0 g of nitrogen gas?

c) How many grams of sodium azide are required to produce 10.0 ft<sup>3</sup> of nitrogen gas, about the size of an automotive air bag, if the gas has a density of 1.25 g/L? (1 ft<sup>3</sup> = 0.0283 m<sup>3</sup>)

5. A piece of aluminum foil 1.00 cm square and 0.550 mm thick is allowed to react with bromine to form aluminum bromide.  $4AI + 3Br_2 \rightarrow 2AIBr_3$ 

a) How many moles of aluminum were used? (Density of Al =  $2.699 \text{ g/cm}^3$ )

b) How many grams of aluminum bromide form, assuming the aluminum reacts completely?

- j) How many molecules of potassium chloride, KCl , are in 85.5 grams?
- k) The molecular formula of allicin, the compound responsible for the characteristic smell of garlic is  $C_6H_{10}OS_2$ . How many S atoms are present in 5.00mg of allicin?
- I) A sample of glucose,  $C_6H_{12}O_6$ , contains  $1.250 \times 10^{21}$  carbon atoms. How many atoms of hydrogen does it contain?