

Unit Six: Chapter 7 ~ Chemical Formulas & Chemical Compounds

Significance of a Chemical Formula

- Indicates the relative _____ of atoms of each _____ in a chemical compound.
- A chemical formula represents:
 - One _____ (_____ compound)
 - One _____ (_____ compound)
- _____ surround polyatomic ions to identify them as units.
- When there is _____ subscript written next to the atom's symbol its understood _____.

Oxidation Numbers

- _____ or _____ number assigned to an element to show its _____ to combine in a compound.
- Indicates _____ when _____ with another atom.

- Group Numbers correlate to oxidation numbers with the exception of the

_____ and group _____:

▫ 1 = _____

▫ **Zn** = _____

▫ 2 = _____

▫ 17 = _____

▫ **Al** = _____

▫ 16 = _____

▫ **Ag** = _____

▫ 15 = _____

Rules for Writing Chemical Formulas

- The _____ of all of the oxidation #s for the atoms and polyatomic ions

_____ be _____.

- On the _____ (written first):

▫ The element (polyatomic ion) with _____ oxidation #

- On the _____ (written second):

▫ The element (polyatomic ion) with _____ oxidation #

Ionic Compounds

- _____ and _____
- _____ – Uses oxidation numbers
- _____ the chemical formula:
 - 1. Write the _____ for each element/polyatomic ion.
 - 2. Assign the _____ to each element/polyatomic ion (as a _____).
 - 3. _____ the # value only (not the charge) to the other element (now subscript).
 - Put polyatomic ions in _____ if the value is _____.
 - 4. _____ subscripts to lowest ratio (do not write values that are ones).
- **Ex. 1:**

- **Ex. 2:**

- **Ex. 3:**

- **Ex. 4:**

- **Ex. 5:**

Ionic Compounds

- _____ Compounds:
 - 1. Write the _____ of the element/polyatomic ion with the _____

 - Include _____, if possible.
 - _____ can have _____ oxidation numbers.
 - 2. Write the _____ of the polyatomic ion with the _____
_____ the name of the element with _____
_____ as root with - _____.
- **Ex. 1:**
- **Ex. 2:**
- **Ex. 3:**

- **Ex. 4:**

- **Ex. 5:**

Writing and Naming Covalent Compounds

- _____
- Do _____ criss-cross
- Use _____ system to identify the _____ of atoms of each _____ in the molecule.
- The _____ gets a prefix
 - Unless it only has _____ (omit the mono-)
- The _____ gets a prefix and an - _____ suffix
- The "_____" and "_____" endings of the prefixes are _____ when they are attached to "_____."

- **Prefixes**

- 1 → _____

- 6 → _____

- 2 → _____

- 7 → _____

- 3 → _____

- 8 → _____

- 4 → _____

- 9 → _____

- 5 → _____

- 10 → _____

- ***Writing Examples:***

- **Ex. 1:**

- **Ex. 2:**

- **Ex. 3:**

- **Ex. 4:**

▫ **Ex. 5:**

- ***Naming Examples:***

▫ **Ex. 1:**

▫ **Ex. 2:**

▫ **Ex. 3:**

▫ **Ex. 4:**

▫ **Ex. 5:**

Extra Practice Naming and Writing Compounds (link on HW website):

- Dr. Alan's Chemistry Site: <http://chemistry.alanearhart.org/Quizzes/Nomenclature/>
 - He offers quizzes with TONS of practice problems. In the drop down section, select from Binary Molecular Compounds, Binary Ionic Compounds, and/or Polyatomic Ionic Compounds!

Practice Problems – Textbook Page 215

- 2. Name and write formulas for the compounds formed between the following:

a. aluminum and bromine

b. sodium and oxygen

c. magnesium and iodine

d. Pb^{2+} and O^{2-}

e. Sn^{2+} and I^{1-}

f. Fe^{3+} and S^{2-}

g. Cu^{2+} and NO_3^{1-}

h. NH_4^{1+} and SO_4^{2-}

- 3. Name the following compounds using the Stock System:

a. NaI

b. MgS

c. CaO

d. K_2S

e. CuBr

f. FeCl_2

- 4. Write formulas for each of the following compounds (criss-cross where necessary):

a. barium sulfide

b. sodium hydroxide

c. lead (II) nitrate

d. potassium permanganate

e. iron (II) sulfate

f. diphosphorus trioxide

g. disulfur dichloride

h. carbon diselenide

Formula and Molar Mass

- The _____ of any molecule, formula unit, or ion is the _____ of the average atomic masses of all the atoms represented in its formula.
- The _____ is the mass of _____ of a chemical compound.
 - Numerically _____ to the formula mass.
 - Measured in _____.
- Determining moles from subscripts:
 - **Ex 1:**
 - **Ex.2:**
- ***Formula & Molar Mass Problems:***
 - **Ex.1:**

▫ **Ex.** 2:

▫ **Ex.** 3:

▫ **Ex.** 4:

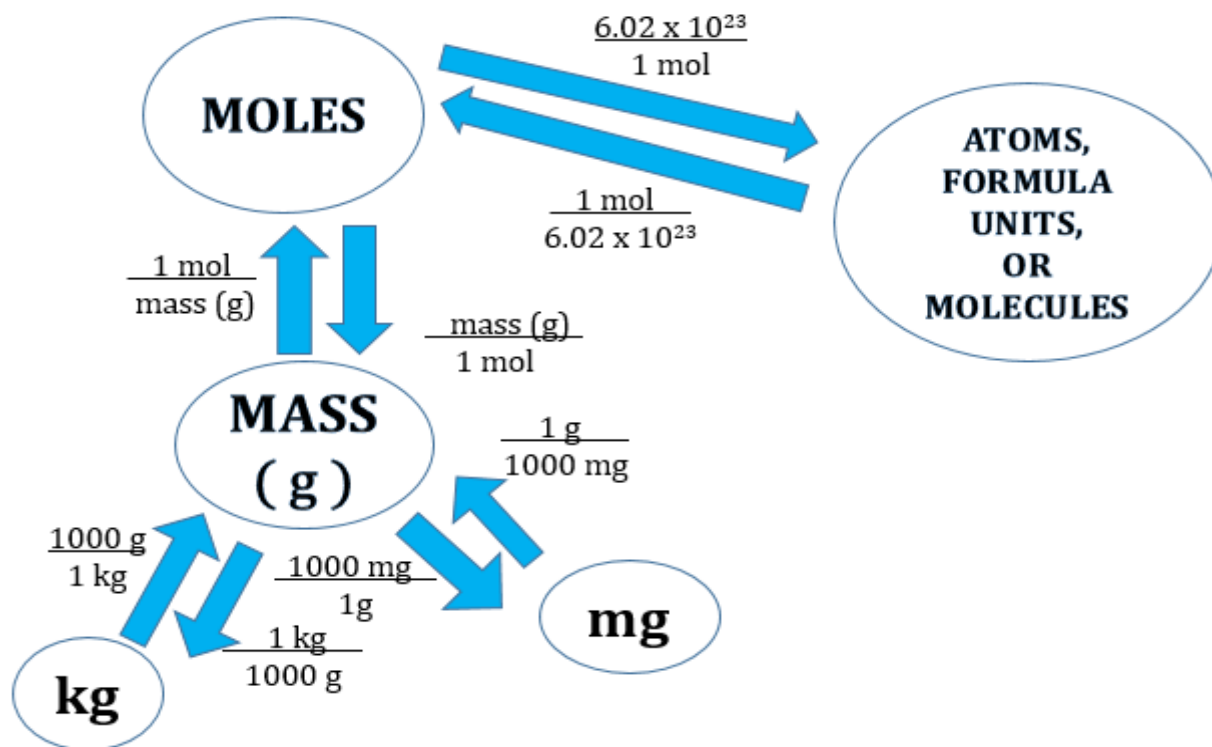
Extra Practice Calculating Formula & Molar Mass (link on HW website):

- **Dr. Alan's Chemistry Site:** <http://chemistry.alanearhart.org/Quizzes/Stoichiometry/>
 - He offers quizzes with TONS of practice problems. In the drop down section, Calculating Molar Mass. Check the box to limit molar masses to one decimal place – but remember, in class we carry it out to two decimal places.

Review

- One mole of any substance contains _____ representative particles.

Mole roadmap!



Mole/Mass/#Particle Conversions for Compounds

- Ex. 1:

- **Ex. 2:**

- **Ex. 3:**

- **Ex. 4:**

- **Ex. 5:**

- **Ex. 6:**

Extra Practice Mole/Mass/#Particle Conversions for Compounds (link on HW website):

- **Dr. Alan's Chemistry Site:** <http://chemistry.alanearhart.org/Quizzes/Stoichiometry/>
 - He offers quizzes with TONS of practice problems. In the drop down section, Converting Between Mass and Moles. Check the box to limit molar masses to one decimal place – but remember, in class we carry it out to two decimal places. He doesn't offer any practice problems with # particles (using Avogadro's Number).
- Textbook – Pages 926 – 927 – Look for the problems with compounds and not just elements.

Percentage Composition

- The percentage by _____ of each element in a compound is known as the _____ of that compound.
- % composition =

- The percent composition of an element in a compound is the _____
regardless of the sample's size.

- **Ex. 1:**

- **Ex. 2:**

- **Ex. 3:**

- **Ex. 4:**

- **Ex. 5:**

Extra Practice Calculating Percent Composition:

- Textbook – Page 928.

Salt

- _____ compound
 - Made up of a _____ (_____) and a _____ (_____)
- Usually forms from _____ reaction between an acid & a base.
- Examples:
 - Potassium bromide
 - _____

- Magnesium chloride

- _____

- Copper (II) sulfate

- _____

Acid

- _____ compound

- Made of _____

- _____ in water releasing _____ (including _____)

- Examples:

- _____

- _____

- _____

- _____

- _____

Empirical Formulas

- Chemical formula with the _____ ratio of atoms
- For _____ compounds – the empirical formula is the way the formula is written for the actual compound
 - What you already do... reduce in criss-cross.
- For _____ compounds – the empirical formula may not be the way the formula is written for the actual compound

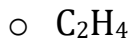
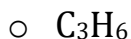
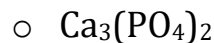
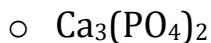
Molecular Formulas

- _____ chemical formula for the compound
- Shows the way the chemical compound is _____ from the _____
- _____ be the same as the empirical formula
 - _____ – will be the same
 - _____ – some will be the same and some won't

- **Examples:**

Molecular Formula

Empirical Formula



Exam Date: _____

- **Chemical Formulas & Chemical Compounds (Chapter 7)**

- ✓ Write ionic compound formulas & names – Stock system
- ✓ Oxidation numbers for monatomic & polyatomic ions (used in ionic compounds)
- ✓ Write covalent compound formulas & names – Prefix system
- ✓ Formula mass / Molar mass for compounds
- ✓ Mass (g/kg/mg) to amount (moles) to # of particles (molecules/formula units) conversions
- ✓ Percent (%) composition
- ✓ Acids & Salts
- ✓ Empirical & Molecular formulas