Note: This file contains lecture notes from last Tuesday's ZOOM presentation that was abbreviated because of time.

It is a Word file that has some slides spliced in. As a result there are some annoying gaps in the file.

I have found navigating the file to be easiest by using the touchpad and curser to manipulate the scroll bar along the right hand margin.

BASIC SCIENCE

APRIL 29, 2020
REACTIONS
(CHAPTER 9)
Pages 188 - 193

LECTURE PAGE 188-191

- **The <u>CHEMICAL FORMULA</u> FOR A COMPOUND CAN BE DETERMINED BY MAKING USE OF THE OXIDATION NUMBERS PROVIDED IN TABLE 9-2 PAGE 188**

- **A KEY TO EMPLOYING THIS TOOL IS TO ALWAYS PUT THE LESS ELECTRONEGATIVE ELEMENT FIRST**
- **THE RESULT OF THIS THAT IN A CHEMICAL FORMULA THE MORE METALLIC ELEMENT IS ALWAYS LISTED FIRST.**

PROCESS STEPS PAGE 189

- **LIST MEMBER ELEMENTS OF FORMULA, LEAST ELECTRONEGATIVE FIRST -> MgCl**
- **GO TO TABLE TO DETERMINE OXIDATION NUMBERS Mg (+2), Cl (-1)**
- **IN ALL <u>COMPOUNDS,</u> OXIDATION NUMBERS NUMBERS MUST ADD UP TO ZERO**
- **THIS CAN BE DONE ARITHMETICALLY OR "GRAPHICALLY"**
-

GRAPHICAL METHOD:

- **WRITE ABBREVIATED FORMULA WITH OXIDATION NUMBERS Mg(+2)Cl(-1)**
- **DROP THE SIGNS OF THE OXIDATION NUMBERS Mg (2)Cl(1)**
- **FLIP FLOP NUMBERS BETWEEN ELEMENTS Mg{1)Cl(2)**
- **ASSIGN THE NEW NUMBERS AS SUBSCRIPTS $MgCl_2$**
- **IF USING ARITHMETIC METHOD IT IS OCCASIONALLY NECESSARY TO FIND THE LOWEST COMMON MULTIPLE (PAGE 190-191)**
- **IF THE RESULT OF A CHEMICAL FORMULA WERE TO BE SIMILAR TO X_3Y_3 REALIZE THAT THE FORMULA COULD BE REDUCED TO XY**

Polyatomic Ions

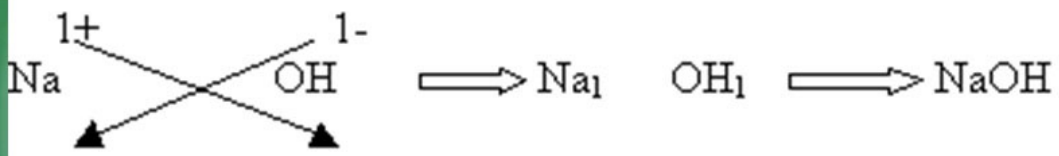
PAGE 192 – 193

Polyatomic ion

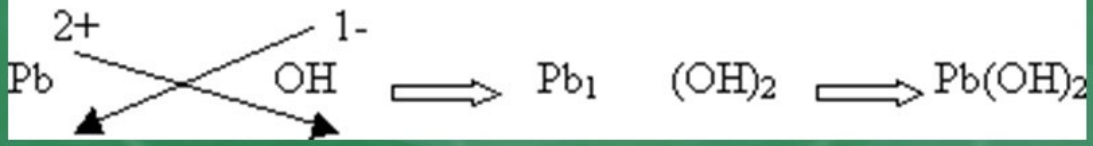
- **Poly** – means more than one
- **Atomic** – means atoms
- **Polyatomic** –means more than one atom
- **Ion** – means charged particle

- **Polyatomic ion** – is a charged molecule containing more than one atom
  - $(OH)^{-1}$

Example 5 – Sodium hydroxide (caustic soda)



Example 6 – Lead hydroxide



Chemical Formula	Ion Name
NH_4^+	Ammonium
$C_2H_3O_2^-$	Acetate
ClO_3^-	Chlorate
MnO_4^-	Permanganate
NO_3^-	Nitrate
OH^-	Hydroxide
CO_3^{2-}	Carbonate
CrO_4^{2-}	Chromate
SO_4^{2-}	Sulfate
PO_3^{4-}	Phosphate

Rules

1. Write the positive ion (cation) first.
2. Compounds need to be neutral after ions combine.
3. Subscripts outside of parenthesis are given to ALL elements inside the parenthesis.
   EX. $Mg(ClO_4)_2$ →2 Cl atoms, 8 O atoms

POLYATOMIC LECTURE

- **POLYATOMIC IONS NEED TO BE TREATED AS A COMBINED UNIT JUST AS IF THE COMBINATION IS A SINGLE ENTITY**
- **THE SAME STEPS USED WITH SINGLE ATOMS (IONS) ARE USED WITH POLYATOMIC IONS (SEE PAGE 189)**

- **IT IS IMPORTANT THAT POLYATOMIC IONS THAT REQUIRE A SUBSCRIPT MUST BE ENCLOSED IN PARENTHESES >> $Ca(OH)_2$**
- **IN THE UNUSUAL CASE WHEN THE POLYATOMIC ION IS POSITIVE (NH_4^+)**

IT SHOULD APPEAR FIRST IN THE CHEMICAL FORMULA : NH_4Cl (AMMONIUM CHLORIDE)

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- **NEXT WEEK NAMING COMPOUNDS, CHEMICAL EQUATIONS READ PAGE 194-200**