NOMENCLATURE OF INORGANIC COMPOUNDS

I. Nomenclature come from two latin words, "nomen" which means name and "colors" which means "to call".

II. SYSTEMS OF NAMING COMPOUNDS

1. Common name or trivial names – this refers to the old system of naming compounds.
2. Systematic name – this includes the IUPAC system and the stock system.

III. CLASSES OF COMPOUNDS

A. Binary compounds – those compounds which consist of 2 elements.
B. Polyatomic compunds – those compounds which consist of 3 or more elements.

A. NAMING BINARY COMPOUNDS

In naming binary compounds, the electropositive element is named first followed by the electronegative element. The electronegative element is named with the suffix-ide.

1. Compounds of a metal and a non-metal:
   Example:
   NaCl – sodium chloride
   BaS – barium sulfide
   ZnO – zinc oxide

If an element forms more than one oxidation state, it is necessary to distinguish between the states.

A. **Old System**- makes use of the suffixes-ous and –ic
   - ous is used to denote a lower oxidation state
   - ic is used to denote a higher oxidation state

*note: Neither of the 2 endings denote a particular state but only whether it is lower than the other

B. **New System**- "Stock name" uses roman numeral to denote the oxidation state of the metal.

Example:

FORMULA	COMMON NAME	STOCK NAME
$FeCl_2$	Ferrous Chloride	Iron (II) chloride
$FeCl_3$	Ferric Chloride	Iron (III) chloride
Cu_2O	Cuprous oxide	Copper (I) oxide
CuO	Cupric oxide	Copper (II) oxide

2. Compounds if a non-metal:

Example:

FORMULA	COMMON NAME	STOCK NAME
H_2O	Water	Dihydrogen oxide
NH_3	Ammonia	Trihydrogen nitride
CH_4	Methane	Tetrahydrogen carbide

*note: In the systematic name, the following (Greek) numerical prefixes are used to denote the number of atoms in the molecule. The prefixes mono- may be dropped as is commonly used or used o emphasize the existence of different compounds made up of two the same atoms.

1 = mono-	5 = penta-	9= nona-
2 = di-	6 = hexa-	10= deca-
3 = tri-	7 = hepta-	
4 = tetra-	8 = octa-	

Example:

N_2O- dinitrogen oxide	N_2O_3- dinitrogen pentoxide	NO- nitrogen oxide
NO_2- nitrogen dioxide	PCl_3- phosphorus trichloride	PCl_5-phosphorus pentachloride

B. NAMING POLYATOMIC COMPOUNDS

1. For oxy- compounds with more oxygen atoms in the formula, the suffix- **ate** is used, while those with less oxygen atoms, use the suffix- **ite**.

Example: $KClO_3$ – potassium chlorate Na_2SO_4 – sodium sulfate
$KClO_2$ – potassium chlorite Na_2SO_3 – sodium sulfite

2.For oxy- compounds wherein the central atoms has 4 oxidation state like the halogens (eg. Chlorine), the prefix **hypo**- is used for the compounds with the least number of oxygen atoms, while the prefix **per**- is used for the compounds with the most oxygen atoms.

Example:

FORMULA	**OXIDATION STATE OF CENTRAL ATOM**	**NAME**
NaClO	+1	Sodium hypochlorite
$NaClO_2$	+3	Sodium chlorite
$NaClO_3$	+5	Sodium chlorate
$NaClO_4$	+7	Sodium perchlorate

C. NAMING ACIDS

1. Binary acids (usually hydrogen and a non-metal) are named as in other **binary compounds** when they are **pure**. When their solutions are referred to, hydrogen is replaced by the prefix **hydro**- while the ide-ending of the non-metal is changed to – **ic** and the word acid is added.

Example:

FORMULA	**PURE SUBSTANCE**	**AS A SOLUTION**
HCl	hydrogen chloride	hydrochloric acid
HF	hydrogen fluoride	hydrofluoric acid

2. Polyatomic acids are named by changing the –ate or the –ite endings of the anions to **–ic** or **–ous,** respectively.

Example:

ION	FORMULA	NAME
(NO_3^-) nitrate	HNO_3	nitric acid
(SO_4^{2-}) sulfate	H_2SO_4	sulfuric acid
(ClO_4^-) perchlorate	$HClO_4$	perchloric acid
(NO_2^-) nitrite	HNO_2	nitrous acid
(SO_3^{2-}) sulfite	H_2SO_3	sulfurous acid
(ClO_2^-) chlorite	$HClO_2$	chlorous acid

D. .NAMING BASES

1. Polyatomic bases are usually made up of metals and OH^- (hydroxide anion), hence are named by naming the metal followed by the hydroxide.

2. For metals with different oxidation state, the roman numeral denoting the oxidation state is inserted and enclosed in parenthesis or the -ic/-ous system as in binary compounds are used.

   Example:

   NaOH – sodium hydroxide
   $Mg(OH)_2$ – magnesium hydroxide
   $Fe(OH)_3$ – iron (III) hydroxide or ferric hydroxide
   $Fe(OH)_2$ – iron (II) hydroxide or ferrous hydroxide