Nomenclature of Inorganic Compound

Inorganic compound Name consist of mainly two part:

1. Cationic part (or Less Electronegative)
2. Anionic part

Name cationic part:

Generally ends with suffix – 'ium'

Name of anionic part:

Generally end with suffix

A. -ide

B. -ate

C. -ite

Elemental or non-oxo anion

Generally end with -ide

Example:

Group – 17

Cl^- → chloride, Br^- → Bromide

Group – 16

O^{2-} → Oxide, S^{2-} → sulphide

Se^{2-} → Selenide, Te^{2-} → Telluride

Group – 15

N^{3-} → Nitride, P^{3-} → phosphide

As^{3-} → Arsenide

Group → 14

C^{4-} → carbide* → Al_4C_3, Be_2C

Note:

C^{4-} → Methanide → CaC_2

C_2^{2-} → Acetylide → only CaC_2

C_3^{4-} → Allylenide → only Li_4C_3, Mg_2C_3

Hydrolysis of carbides releases corresponding product

$CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2$

$Mg_2C_3 + 4H_2O \rightarrow 2Mg(OH)_2 + CH_3 - C \equiv CH$

$Al_4C_3 + 12H_2O \rightarrow 4Al(OH)_3 + 3CH_4$

$Be_2C + 4H_2O \rightarrow 2Be(OH)_2 + CH_4$

Note:

O_2^{2-} → peroxide

O_2^{2-} → superoxide

N_3^- → Azide

Naming of Oxoanians

(oxoacid → (general formula $\Rightarrow$ X- OH)

Oxoanion → Anion of oxoacid

Name of oxoanion depends on the name of parent oxoacids.

Case 1: If name Oxoacid end with -ic acid then name Oxoanion end with – ate.

$\underset{\text{Sulphuric acid}}{H_2SO_4} \rightarrow \underset{\text{Sulphate ion}}{SO_4^{2-}}$

HNO_3 ↑ NO_3^-
Nitric acid Nitrate ion

Case-2: If name of acid end with -us acid then name of anion end with -ite

Example:

H_2SO_3 ↑ SO_3^{2-}
Sulphurous acid Sulphite ion

HNO_2 ↑ NO_2^-
Nitrous acid Nitrite ion

Naming of Oxoacid

Name of oxoacid decided by oxidation number of central atom.

Case-1: It an element forms oxoacid in only one Oxidation number then name of acid end with -ic acid.

Example.

$H_2\overset{+4}{C}O_3 \rightarrow$ Carbonic acid

$H_3\overset{+3}{B}O_3 \rightarrow$ **Boric acid**

Case-2: If an element forms oxoacid in two different Oxidation number then

O. N	Suffix
Higher	– ic
Lower	– us

Example:

$H_2\overset{+6}{S}O_4 \rightarrow ?$

$H_2\overset{+4}{S}O_3 \rightarrow ?$

Case-3: If an element form oxoacid in 3 different Oxidation number then

O.S	Suffix
Highest	–ic
Next lower	-us
Next lower	–hypo – us

Example - 1:

$H_3\overset{+5}{P}O_4 \rightarrow$ Phosphoric acid

$H_3\overset{+3}{P}O_3 \rightarrow$ Phosphorous acid

$H_3\overset{+1}{P}O_2 \rightarrow$ Hypo phosphorus acid

Example - 2:

$H\overset{+5}{N}O_3 \rightarrow$ Nitric acid

$\overset{+3}{HNO_2}$ → Nitrous acid

$H_2\overset{+1}{N_2}O_2$ → Hypo nitrous acid

If an element from oxoacid in 4 different order number then,

O. S	Suffix
Highest	-per -ic
Next lower	-ic
Next Lower	-us
Next Lower	-hypo -us

Example:

$\overset{+7}{HClO_4}$ → Perchloric acid

$\overset{+3}{HClO_2}$ → Chlorous acid

$\overset{+5}{HClO_3}$ → Chloric acid

$\overset{+1}{HClO}$ → Hypochlorous acid

SOME DERIVED OXOACID

→ Pyro acid

→ Meta acid

1. Meta Acid:

One molecule of acid $\xrightarrow{-H_2O}$ Meta Acid

$\underset{\text{Boric acid}}{H_3BO_3} \xrightarrow{-H_2O} \underset{\text{Meta boric acid}}{HBO_2}$

Sodium Metaborate → $NaBO_2$

(multiple choice question)

Q. Which will not form Meta acid

A. H_3PO_4 B. $HClO_4$

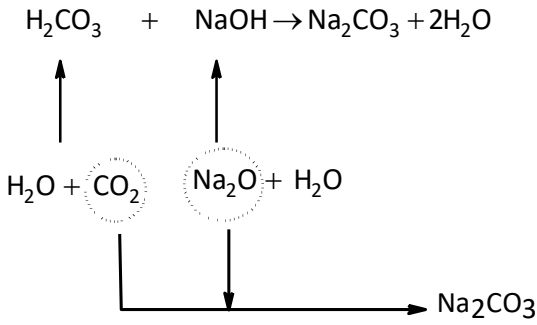
C. H_3BO_3 D. H_2CO_3

Pyro Acid

2 molecules of acid $\xrightarrow{-H_2O}$ Pyro Acid

$2H_2SO_4 \xrightarrow{-H_2O} H_2S_2O_7$ pyro sulphuric acid (oleum or fuming sulphuric acid)

Thermal Stability of salt



Q. Arrange following salts according to their decreasing thermal stability
Li_2CO_3, Na_2CO_3, K_2CO_3, Rb_2CO_3, CS_2SO_3

Ans.

$Li_2CO_3 \rightarrow Li_2O + CO_2$
$Na_2CO_3 \rightarrow Na_2O + CO_2$
$K_2CO_3 \rightarrow K_2O + CO_2$
$Rb_2CO_3 \rightarrow Rb_2O + CO_2$
$CS_2CO_3 \rightarrow CS_2O + CO_2$

Decomposition Trends of different salts

1. Carbonates:

Case-1:

Na_2CO_3
K_2CO_3
Rb_2CO_3
Cs_2CO_3
$\xrightarrow{\Delta}$ **no effect**

Case-2:

$Ag_2CO_3 \rightarrow 2Ag + ½\ O_2 + CO_2$
$HgCO_3 \rightarrow Hg + ½\ O_2 + CO_2$

Case-3:

$Li_2CO_3 \rightarrow Li_2O + CO_2$
$CaCO_3 \rightarrow CaO + CO_2$

Case-4: $(NH_4)_2\ CO_3 \rightarrow 2NH_3 + CO_2 + H_2O$

Sulphate

Case 1:

Na_2SO_4
K_2SO_4
Rb_2SO_4
Cs_2SO_4
$\xrightarrow{\Delta}$ **no effect**

Case 2:

$Ag_2SO_4 \rightarrow Ag + O_2 + SO_3$
$HgSO_4 \rightarrow Hg + O_2 + SO_3$

Case 3:

$Li_2SO_4 \rightarrow Li_2O + SO_3$

$ZnSO_4 \rightarrow ZnO + SO_3$

Case-4: $(NH_4)_2 SO_4 \rightarrow 2NH_3 + SO_3 + H_2O$

* $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$

Nitrate

Case-1: $NaNO_3$, KNO_3, $RbNO_3$, $CsNO_3$ $\xrightarrow{\Delta} MNO_2 + O_2$

Note: $NaNO_3$, KNO_3, $RbNO_3$, $CsNO_3$ $\xrightarrow[T > 800^\circ C]{\Delta} M_2O + N_2 + O_2$

Case-2: $AgNO_3 \rightarrow Ag + NO_2 + ½\ O_2$

$Hg(NO_3)_2 \rightarrow Hg + 2NO_2 + O_2$

Case-3: $2LiNO_3 \rightarrow Li_2O + 2NO_2 + ½\ O_2$

$Mg(NO_3)_2 \rightarrow MgO + 2NO_2 + ½\ O_2$

Case-4: $NH_4NO_3 \rightarrow N_2O + 2H_2O$