## *SECTION 13*

## NOMENCLATURE OF INORGANIC COMPOUNDS

**Inorganic compound**: Compounds of elements other than carbon, but including carbon oxides, carbonates.

The Greek and Latin prefixes given in *section 6* also play an important role in inorganic nomenclature.
Definitive rules for naming inorganic compounds have been agreed on internationally, but as these can lead to rather clumsy names many common names for well known compounds remain in use.

Ionic compounds are called **salts** except where the anion is $O^{2-}$ or $OH^-$ in which case the compounds are called **oxides** and **hydroxides** respectively.

Some polyatomic ions have accepted non-systematic names: $NH_4^+$, ammonium; $H_3O^+$, oxonium (hydronium) (also often just called hydrogen ion in aqueous solutions); $OH^-$, hydroxide; $NH_2^-$, amide; $CN^-$, cyanide.

In nomenclature, polyatomic ions or molecules are often considered to be made up of a positively charged species, (the charge being indicated by an oxidation number), surrounded by **ligands**, (neutral or negatively charged species), which each have a pair of electrons on the atom bonded (**coordinated**) to the central cation. The names for the two common neutral ligands, water and ammonia, are *-aqua*, $H_2O$, and *-ammine*, $NH_3$, respectively. Negatively charged ligands have the ending *-o*. [e.g. $Cl^-$, *-chloro*; $OH^-$, *-hydroxo*; $O^{2-}$, *-oxo*; $CN^-$, *-cyano*]. (The International Union of Pure and Applied Chemistry is considering changing the ending of simple anion ligands such as chloride to –ido. The examples above would be *chlorido*, *hydroxid*o, *oxido*, *cyanido*.)

A brief outline of the definitive rules and traditional naming is given below. The examples should clarify the rules.

*Systematic naming rules*

**1** The cation has its name unmodified (e.g. the name of the element).
**2** If the anion is monatomic its name is modified to end in -ide.
**3** If the anion is polyatomic its name is modified to end in -ate.
**4** When oxidation states are to be indicated they are shown by Roman numerals in brnumkes nfollowng rhe name of the element

| | | |
|---|---|---|
| KBr | is potassium bromide | rules **1,2** |
| $Ca(OH)_2$ | is calcium hydroxide | rule **1** |
| $NaClO_3$ | is sodium trioxochlorate(V) | rules **1,3,4,5** |
| $FeCl_3$ | is iron trichloride or iron(III) chloride | rules **1,2,4,5** |
| $Cu(NH_3)_4F_2$ | | |

Most of the covalent oxides are named according to the relative number of atoms of the element and oxygens [e.g. $SO_2$, sulfur dioxide; $SO_3$, sulfur trioxide; $N_2O_3$, dinitrogen trioxide]. Oxoacids may be thought of as coming from the hydrolysis of the oxide containing the element in the same oxidation state.

[e.g. $SO_2 + H_2O \rightarrow H_2SO_3$ sulfur dioxide giving sulfurous acid
$SO_3 + H_2O \rightarrow H_2SO_4$ sulfur trioxide giving sulfuric acid
$N_2O_3 + H_2O \rightarrow 2HNO_2$ dinitrogen trioxide giving nitrous acid ]

**Acid anhydride**: The product from removing water from an acid. (**Anhydride**, a substance formed by removing the elements of water from a compound.) [e.g. the oxides in the 6fxide con(3 the elem)8