My name is Ravina Jalmi and I am from PES college, in today's chapter we will study nomenclature and further in detail will study generic name, trade name and proper names. CHC151 is the paper code and paper title is general industrial chemistry.

This is the outline, that is generic names, trade names and proper names.

Learning outcomes - nomenclature of commonly used chemical compounds. Cites examples of chemical compounds.
In this topic, we still will study introduction, nomenclature of binary compounds, polyatomic anions and acids.

Now, during the development of chemistry, substances were often given names based on some characteristic property or on their source without their actual relationship with their chemical nature.

Now to explain this, we have the following table.

In first column, common names are given first. For example, aqua fortis that is nitric acid.

It was called aqua fortis before, this is because It can even dissolve metals like silver, so aqua is water and fortis meaning strong, so strong water.

Next one is H_2SO_4 that is sulfuric acid. It was called as oil of vitriol because vitriol, meaning having the glassy appearance, hence the name oil of vitriol.

Then, blue vitriol for Copper sulfate, green vitriol for ferrous sulfate.

Same way for others as given in table and so on.

Now some trivial names are, Methane, ammonia, water are so well established that they are still commonly used now. In this table you can see that systematic name of water is hydrogen oxide and trade name is also saying that is water.

Next one is ammonia, It is also commonly called as Windex. Trade name is also ammonia, the systematic name is hydrogen nitride. Third example is hydrogen carbide, which is commonly called as Marsh gas and trade name is methane.

First hydrogen is a written, for the name this is because hydrogen is less electronegative as compared to next one. Same applies for methane, hence the name hydrogen carbide.

Let’s see binary compounds. Binary compounds are the compound having two elements.

They are named by placing less electronegative element first followed by more electronegative element with its name modified to an *–ide* ending.

To justify this statement, here the following table you can see. In the table you can see, it is actually table salt which we are using for domestic purpose for cooking. Systematic name is sodium chloride.

Now, as i said that, first less electronegative element is written, so sodium is less electronegative as compared to chlorine and that chlorine word is replaced by the word *-ide* in its ending.

Same applies for zinc oxide, lithium hydride, boron trifluoride. Metals which forms more than one oxidation state, it is necessary to distinguish between the oxidation states. Earlier nomenclature uses ending *–ous*, to denote a lower oxidation state, *-ic* ending to denote a higher oxidation state, but neither of the two endings denote a particular oxidation state, but only whether it is a lower or higher than another oxidation state.
To explain this, we have the following table. Now you can see that, Ferrous chloride and Ferric chloride.

Ferrous chloride is in which, iron is having low oxidation state that is +2 and in ferric chloride, iron is having +3 oxidation state, hence the ending *–ous*, since iron is having lower oxidation state and ending *–ic*, as iron is having higher oxidation state that is +3. Same applies for, cuprous oxide and cupric oxide.

Now, knowing the oxidation state from the name makes possible the reconstruction of the formula of the compound. For example, if we take manganese tri oxide, you can see in manganese tri oxide that, from the name we can infer that oxidation state of magnesium in +3 and Oxygen, as you all know that it is
having always two minus charge. So in order to maintain electrical neutrality or to achieve electrical stability, there are two Mn and three oxygen, so the formula becomes Mn_2O_3.

If the elements are more than one in binary compound, the Greek prefixes mono for one, di for two, tri for three, tetra for four, penta for five etc. It is used to express the ratio in the compounds. You can see the below table in which there is compound of nitrogen and oxygen, these are binary compounds, but the ratio of the atom varies. First one is dinitrogen oxide, commonly called as nitrous oxide, N_2O.
Next one is nitrogen oxide. It is called as nitric oxide, then N_2O_3, Dinitrogen trioxide, commonly called as nitrous anhydride. Then last example is N_2O_5, which is dinitrogen pentoxide, commonly called as nitric anhydride.

Next one is polyatomic anions. Polyatomic anions are the ion which have more than one atom, you can see in the table, there are some common polyatomic anions. First one is sulfate, nitrate, nitrite, phosphate carbonate, permanganate, chromate, dichromate and hydroxide.

If the central atom has lower oxidation state, the ending *–ite* is employed.

If the central atom has the higher oxidation state, then ending *-ate* is employed.

You can see it in this table now. See sulfur in sulfate ion. Sulfur is having higher oxidation state hence the ending *-ate*. Now in sulfide, SO_3^{2-} , sulphur is having lower oxidation state, hence the ending *–ite*. Same applies for nitrate and nitrite. Now, oxochloro ion is an example of polyatomic anions.

Now there are four oxidation states of chlorine, which are occurring in this particular oxoanion of chlorine

and -ate and -ite ending are not adequate to indicate four oxidation states, so prefixes are added to

indicate a lower oxidation state, that is hypo and for higher oxidation state, per prefix is used.

Now look here in this following table you can see all four chlorine compounds, first one that

is hypochlorite, oxidation state of chlorine is +1, hence the name hypo chlorite.

The next one is chlorite having oxidation state of chlorine as +3, then chlorate in which oxidation state

of chlorine is +5. The last one is perchlorate with +7 oxidation state of chlorine.
Now per word is because of the higher oxidation state, derived from hyper.

Now we will study acid nomenclature, acids are solutions of hydrogen containing

binary compounds that form ions in water are designated as acids by substituting the ending -ic for

-ide ending and prefix hydro to the name of the non-metal before the word acid.

Now to explain this we have the following examples, you can see here HCl that is hydrochloric acid.

The prefix here we have used is hydro and that chloride, -ide is replaced with –ic ending followed by acid name, hence the name hydrochloric acid.

Same applies for HBr, that is hydrobromic acid, hydrosulfuric acid, and HCN that is hydrocyanic acid. The –ate ending of the name of the salt corresponds to the –ic ending of the oxo acid name. Same way the -ite ending of the salt name goes with -ous ending of the acid. To explain this sentence, we have the following table. Now look here in acid column, first one is H_2SO_4.

So for that is sulfuric acid, also called as oil of vitriol, so corresponding salt name is sodium sulphate. Next one is sulphurous acid, and corresponding salt is sodium sulphite. Now –ic in the first example, the ending -ic which corresponds to –ate ending of the sodium sulfate salt. Now next one is sulphurous acid, -ous ending of acid correspond to –ite ending of the salt. Same applies for nitric acid and nitrous acid. Now acids that contain more than one proton, or the polyprotic acids. Polyprotic acids can form more than one salt depending upon the degree of neutralization. Now, to explain this, we have the following example.

Now look at the reaction, in this it is given that one mole of H2SO4 reacts with one mole of NaOH.

So you are getting Sodium bisulphate, so only one proton is replaced by sodium atom and you get any $NaHSO_4$. But when $NaHSO_4$ reacts with a second mole of base, you are getting Na_2SO_4, that is sodium sulphate that is after complete neutralization you are getting the neutral salt. Now in this table you can see some examples of neutral and acid salts. Acid salts are the ones in which all the protons are not replaced by the base. First one is sodium bicarbonate, its neutral salt is sodium carbonate.

Next one is sodium dihydrogen phosphate and its neutral salt is sodium phosphate. Third example is sodium hydrogen phosphate and its neutral salt sodium phosphate, and last example is potassium hydrogen sulphite and after complete neutralization it gives neutral salt which is potassium sulphite.

This is the reference which I used to prepare this presentation.