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COMPLEXATION BEHAVIOUR OF ALKALI METALS

Before discussing the complexation behaviour of alkali metals, let us first define what is a complex compound. A completely satisfactory definition of this is difficult to give at this stage but we can define a complex compound as a compound having a central metal atom/ion surrounded by a group of ions or molecule called ligands. These ligands are usually bound to the metal by the coordinate bond, i.e. the bond formed by the donation of a lone pair of electrons from one atom (of the ligand) to the other (metal atom/ion). Although both metal and the ligand are usually capable of independent existence as stable chemical species, yet when the complex is formed, it generally retains its identity in solution for example, in solution Fe^{++} and CN^- can exist independently but once the complex $[Fe(CN)_6]^{4-}$ is formed it exists in solution as such, i.e. it does not dissociate appreciably into Fe^{++} and CN^- ; as a result it will not give any test for Fe^{++} and CN^- . It is thus a complex species. The most stable complexes would be formed by the highly polarising cations which have a strong tendency of interacting with electron clouds of other anionic or neutral electron rich species (ligands).

According to the above model, a very weak coordinating ability is expected in the Group 1 metals because of their large size and low charge of the cations, M^+ . According to this view stability of the complexes of the alkali metals should decrease in the order $Li > Na > K > Rb > Cs$ and this is the observed trend also. Alkali metal form few complexes, mostly chelates with the ligands like β -diketones, nitrophenols, nitrosonaphthols, etc as shown in fig 1. They are of low stability.

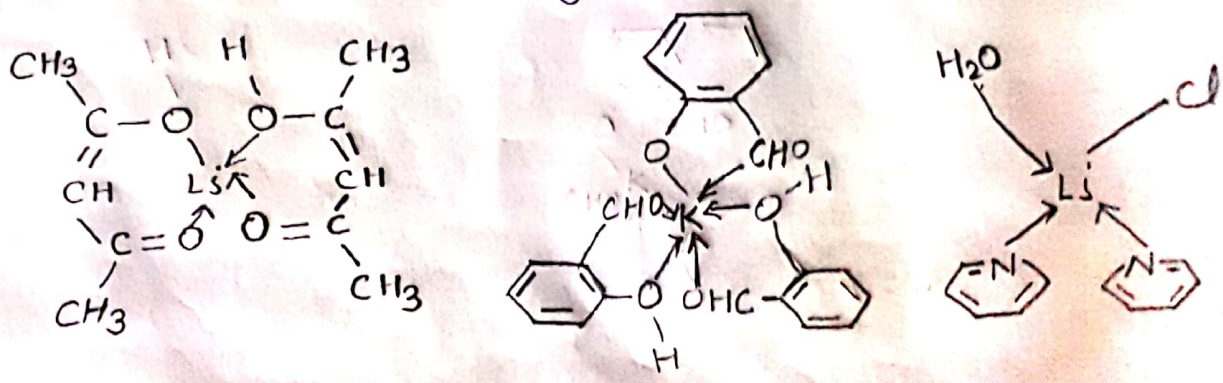


fig.1 Some complexes of alkali metal ions

Lithium being the most polarising cation of all the alkali metals, forms tetrahedral complexes with ligands like NH_3 , CS , HS , N etc.

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