

SOLVATION OF THE ALKALI METAL IONS

When a metal ion is surrounded by the solvent molecules, the phenomenon is called solvation of the metal ion. When the solvent is water it is called hydration. The alkali metal ions are highly hydrated. The smaller the size of the ion, the greater is its degree of hydration. This is because the smaller the size, the more will be its charge density and the more will be its attraction for the polar solvent molecules. Thus, Li^+ ion, which is the smallest, gets more hydrated than the Na^+ ion and so on.

The degree of hydration decreases on moving down the group. As a result of differences in their degree of hydration, the hydrated ionic radii of the alkali metal ions decrease as we go down the ^{group} from lithium to caesium. Li^+ ion has the largest hydrated radius while Cs^+ has the smallest hydrated radius in the first group. You will agree that the smaller the size of the ion and the lighter it is, the more will be its mobility and thus conductance. In this regard we should expect the highest conductance for Li^+ which is the smallest of the alkali metals but this is not so. We have explained above that the hydrated radius of Li^+ is the largest of all the alkali metal ions, in solution. Therefore Li^+ ion is the least conducting in solution. The ionic conductance in solution actually decreases in the order $\text{Cs}^+ > \text{Rb}^+ > \text{K}^+ > \text{Na}^+ > \text{Li}^+$