

When any compound generally ionic is dissolved in a polar solvent or in water, different ions of the compound will get separated and will get surrounded by polar solvent molecules. This phenomenon is hydration/solvation.

The energy released in this process is known as Solvation Energy.

Solubility depends on both lattice and solvation energy.

$$\text{Lattice energy} \propto \frac{1}{r_+ + r_-}$$

$$\left[\begin{array}{l} r_+ = \text{radius of cation} \\ r_- = \text{radius of anion} \end{array} \right]$$

$$\text{Solvation energy} \propto \frac{1}{r_+} + \frac{1}{r_-}$$

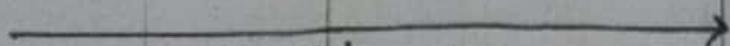
If difference between radii of cation and anion is large then solvation energy dominates.

If difference between radii of cation and anion is small then lattice energy dominates.

For solubility,

$$\boxed{\text{Solvation Energy} > \text{Lattice Energy}}$$

LiF LiCl LiBr LiI



Solubility increases

Difference in size b/w

Li^+ and anion increases.

