WHAT IS POLARIZATION?

The negative charge on an isolated anion is evenly distributed around the nucleus. But in the presence of a cation, the electron density is distorted towards it. Thus the negative charge is unevenly distributed over the anion. One end of the anion gets a relatively more negative charge than the other end. This condition is referred to as polarization.

Fajan's rules were developed based on the concept: ***"the greater the polarization of anion, the greater is the covalent nature"***. There are two factors which are crucial in deciding the extent of polarization as mentioned below.

i) Polarizing power of cation:

The ability of a cation to polarize the anion is referred to as polarizing power. It is directly proportional to the charge density, which in turn is directly related to the charge on cation, while inversely related to the size of anion.

The polarizing power increases with increase in the size of cation i.e. smaller cations are very effective in the polarization of anion.

However, the polarizing power increases with increase in the charge on cation.

ii) The polarizability of an anion:

It is the tendency of an anion to undergo polarization. It indicates the easiness with which an anion undergoes distortion in presence of a cation.

It is directly proportional to the size as well as the negative charge on the anion.

The larger anions can undergo distortion very easily than the smaller ones.

It is also important to note that the anions with greater negative charge also undergo polarization easily.

We can easily conclude that greater the polarizing power of cation and greater the polarizability of anion, greater is the polarization and hence greater will be the covalent nature. Based on above discussion now we can write Fajan's rules