Abstract

Dielectric relaxation spectroscopy in liquids is widely used for determination of the structure and associated liquid properties which are helpful to study the molecular interactions. The determination of intermolecular dynamics of liquids can be best understood at microwave frequency range; hence at microwave frequency dielectric relaxation is used to study the interaction of polar molecules with neighboring polar as well as non polar molecules. Dielectric relaxation is nothing but applying electric field to the atoms, molecules that results polarization through readjustment of molecules from equilibrium. The displacement of molecules on application of electric field is frequency and temperature dependent. Dielectric relaxation of liquids contains measurement of dielectric permittivity and dielectric loss at microwave frequencies.

The hydrogen bond is an attractive interaction between a hydrogen atom from a molecule or a molecular fragment A-H in which A is more electronegative than H, and an atom or a group of atoms in the same or a different molecule, in which there is evidence of bond formation. A typical hydrogen bond may be depicted as A-H----B-C, where the three dots denote the bond A-H represents the hydrogen bond donor. The acceptor may be an atom or an anion B, or a fragment or a molecule B-C, where B is bonded to C. In some cases, A and B are the same. In more specific cases, A and B are the same and A-H and B-H distances are the same as well leading to symmetric hydrogen bonds. Water and alcohols are some of the examples of H-bonded liquids.

Alcohols are compounds in which hydroxyl (-OH) group is attached to saturated Carbon atom. The hydroxyl group is a functional group of alcohols. Their general formula is R-OH and these are classified as monohydric, dihydric, trihydric and polyhydric alcohols depending upon the number of hydroxyl groups. The O-H bond in alcohol is highly polar, because oxygen is highly electronegative. The polarity of O-H
bond gives rise to attraction of partially positive hydrogen atoms of other molecules. Due to this, hydrogen bonding requires a great deal of energy in the form of heat to overcome these attractive forces. The H-bond has a considerable effect on the dielectric properties of the associated polar liquids. The formation of molecular structures and network structures through hydrogen bonds is the main cause of complex molecular structures in alcohols.