INTRODUCTION

Molecular behaviour of dielectric liquids under the influence of electromagnetic radiation has been a subject of investigation for many years and the different aspects has been emphasized in different periods.

In 1912, Debye succeeded in deriving an extension of Clausius-Mosotti equation and showed that the dielectric constant depends not only on the molecular polarizability, but also on the permanent electric moment of the molecules. On the basis of this concept of molecular permanent dipole moment in the theory of dielectrics, he explained the anamolous dispersion of dielectric constant which was observed by Drude and others workers. He further pointed out that the process of orientation of the permanent electric moment connected with changes in the field requires a definite time interval, since it depends on the rotational movements accomplished by the molecules.

From Debye assumption concerning the molecular reorientation, it follows that after the removal of an externally applied field the average dipole orientation decay exponentially with time. The characteristic time of this exponential decay is called the dipole relaxation time.

Experimentally the relaxation time was found to depend exponentially with the reciprocal of temperature, this led to consideration of the dielectric relaxation process, which is nothing but a rate phenomenon.

Several modifications and extensions of Debye's theory for dielectric relaxation time have been proposed. This lead to the replacement of the single relaxation time by a set of different relaxation times in the description of the macroscopic relaxation process. For the description of the experimental results in the microwave region the continuous distribution of relaxation time was also proposed in many cases.

It appears from the above account that in this way in the near future further advancement may be achieved in the theory of dielectric polarization and dielectric dispersion in order to understand the molecular and intermolecular structure in the pure liquid and solution.

Thus, in order to have a clear idea of the subject of dielectric polarization and its relation with molecular structure a brief survey of various theories and their modification together with a brief review of earlier works are given in the following sections. The scope and object of the present investigations are given at the end of this section.