INTRODUCTION

Dielectric behaviour of substances under the influence of electromagnetic radiation in the metre-wave length region has been a subject of investigation for many years and the different aspects being emphasized in different periods. In 1912, Debye succeeded in deriving an extension of the Clausius-Mossotti 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 the existence of permanent electric moments in the molecules, the anomalous dispersion could also be understood and a better insight in the intermolecular forces was obtained.

Debye introduced the concept of molecular permanent dipole moment in the theory of dielectrics. He explained with the help of this concept the anomalous dispersion of dielectric constant observed by Drude and other workers. He further pointed out that the process of orientation of the permanent electric moment ~~xm~~ connected with changes in the field requires a definite time interval, since it depends on the rotational movements accomplished by the molecules.

From Deby'es assumption concerning the molecular reorientations, it follows that after the removal of an externally applied field the average dipole-orientation decay exponentially with time. The characteristic time of the this exponentially decay is called the relaxation time.

Experimentally the relaxation time was found to depend exponentially with reciprocal temperature. This led to consideration of the dielectric relaxation time process as a rate phenomenon. Several modifications and extensions of Debye's theory for dielectric relaxation time have been proposed w which 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 the introduction of continuous distribution of relaxation times was also proposed in many cases. Cole and Cole gave an important graphical method, so called Cole-Cole plot, to distinguish these cases from that of single relaxation time. It appears from the above account that in this way in the near future further advances may be achieved in the theory of dielectric polarization and more investigation can be done on dielectric relaxation time in order to understand the molecular and intermolecular structure in the liquid state or in solution.

In order to have a clear understanding of the subject of dielectric polarisation and its relation with molecular structure, a brief survey of the development of various theories of dielectric polarisation and their modifications together with a brief review of earlier works are given in the following sections. The scope and objects of the present investigations are given at the end of the section.