Preface

Dielectric investigation of polar liquids in nonpolar solvents under static and high frequency electric fields is of much importance as it provides one with the shapes, sizes and structural information of the molecules. The present thesis entitled "Dielectric behaviour of some polar liquids under high frequency electric field" represents a large amount of diligent work and careful analysis on some dielectropolar molecules. The theoretical basis within the framework of Debye and Smyth model is beautifully reviewed in first two chapters. The methodology so far developed in this thesis to study dielectropolar liquids in nonpolar solvents is very simple and straightforward. The basic soundness of the methods is tested on several systems of polar liquids in nonpolar solvents as presented in chapters 3 to 8 from the estimated dipole moments μ_j's in terms of measured relaxation times τ_j's.

Part A of the thesis is devoted to the development of various theories derived from the different models for the evaluation of τ and μ and energy parameters like enthalpy of activation ΔH_τ, entropy of activation ΔS_τ and free energy of activation ΔF_τ for binary as well as ternary polar-nonpolar liquid mixtures under high frequency (hf) electric field.

Part B of the thesis, on the other hand, is concerned with the experimental set up to study the feasibility of the methods in radio frequency range. The experiment can easily be made with the Radio frequency (rf) oscillator. Details of experimental measurement technique have been described in Chapter 9. The important findings on different polar-nonpolar liquid mixtures are presented in this chapter.

Thus the entire subject matter of the thesis is aimed at important information on structural configurations of polar molecules as well as inductive and mesomeric moments of the substituent polar groups measured in terms of dielectric relaxation parameters of ϵ'_{ij}, ϵ''_{ij}, ϵ_{oij}, and $\epsilon_{\infty ij}$, in C.G.S. units and dimensionless dielectric constants K_{ij}',K_{ij}'', K_{oij} & $K_{\infty ij}$ in S.I. units.