Dielectric Relaxation Studies of Mixtures of *N*-Methylacetamide and Ethanol in Benzene Solutions Using Microwave Absorption Technique

Raman Kumar, Vir Singh Rangra, Dhani Ram Sharma, Nagesh Thakur,
and Nainjeet Singh Negi

Electronics Research Laboratory, Physics Department, Himachal Pradesh University, Shimla 171005,
India

Reprint requests to V. S. R.; E-mail: vs_rangra@yahoo.co.in

Using standard standing wave microwave X-band techniques, and by following Gopala Krishna's single frequency (9.90 GHz) concentration variational method, the dielectric relaxation times (τ) and dipole moments (μ) of binary mixtures of different molar concentrations of ethanol (EtOH) in binary mixtures of *N*-methylacetamide (NMA) and ethanol in benzene solutions at 25, 30, 35 and 40 ℃ have been calculated. The activation parameters (ΔH_ε, ΔF_ε, ΔS_ε) for the dielectric relaxation process of binary mixtures containing 30 mol% of EtOH have been calculated at 25, 30, 35 and 40 ℃ and compared with the corresponding viscosity parameters. A good agreement between the free energy of activation from these two sets of values shows that the dielectric relaxation process, like the viscous flow, can be treated as a rate process. From relaxation time behaviour of NMA and EtOH binary mixtures in benzene solution, solute-solute and solute-solvent types of the molecular association have been predicted.

Key words: Dielectric Relaxation; Solute-Solute Interaction; Relaxation Times;
          Microwave Absorption Studies.