Dielectric Relaxation of Benzonitrile in Benzene

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The dielectric constant, ε', and dielectric loss, ε'', of dilute solutions of benzonitrile (C_6H_5CN) in benzene have been measured at 9.885 GHz at 25, 30, 35, and 40 °C using standard standing microwave techniques. Following the single frequency concentration variational method of Gopala Krishna, the dielectric relaxation time, τ, and the dipole moment, μ, at various temperatures have been calculated. It was concluded that dielectric relaxation processes can be treated as rate processes just like the viscous flow process. Based on the above studies, the monomer structure of benzonitrile in benzene has been inferred. The solute-solvent molecular association of benzonitrile in benzene has been found. The energy parameters ΔH_ε, ΔF_ε, ΔS_ε for the dielectric relaxation process of benzonitrile in benzene at different temperatures have been calculated and compared with the corresponding energy parameters ΔH_η, ΔF_η, ΔS_η for the viscous flow process.

Key words: Microwave Absorption; Dielectric Relaxation; Dielectric Constant; Benzonitrile;
        Solute-Solvent Interaction.