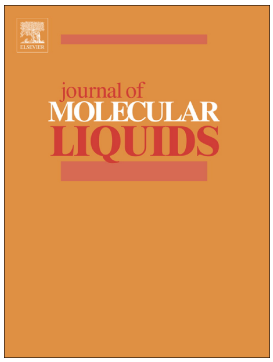

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Dielectric and electrical behaviour over the static permittivity frequency regime, the refractive indices and viscosities of PC–PEG binary mixtures

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ABSTRACT

The complex permittivity, alternating current electrical conductivity, electric modulus and the impedance dispersion over the frequency range from 20 Hz to 1 MHz for the propylene carbonate (PC) and poly(ethylene glycol) (PEG; molecular weight 200 g mol^{-1}) mixtures spanning the entire mixing range have been investigated. The Nyquist plots of electric modulus and impedance for these polar liquid mixtures exhibit the Debye–type dispersion corresponding to the conductivity and electric double layers relaxation processes, respectively. The values of static permittivity, dc electrical conductivity, refractive index and viscosity of the PC–PEG mixtures in the temperature range 5–55 °C have been reported. The excess properties of static permittivity, refractive index, and viscosity confirm the hydrogen-bond interactions between the PC and PEG molecules in their mixtures. The temperature dependent dc conductivity and viscosity of the PC–PEG mixtures obey the Arrhenius behaviour, and the activation energies of the mixtures decrease with an increase of PC concentration. The Stokes-Einstein relation for the conductivity in viscous media holds only for the PC-rich of PC–PEG mixtures.

Keywords: Propylene carbonate, Poly(ethylene glycol), Dielectric properties, Refractive index, Viscosity

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