



Complex formation in binary propionic acid-triethylamine mixtures: a dielectric relaxation and titration study.

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Streszczenie

Complex (dielectric) permittivity spectra of propionic acid-triethylamine mixtures have been measured using four different frequency domain methods to cover the frequency range from 1 MHz to 40 GHz. At 20 °C spectra have been determined at eight mole fractions x_b of base between 0.11 and 0.8. For one mixture ($x_b=0.3$) measurements have been performed at ten temperatures between -20 °C and 25 °C. Additionally, the extrapolated low frequency (static) permittivity of the propionic acid triethylamine system has been obtained at $0 \leq x_b \leq 1$ from titration measurements in the frequency range between 1 MHz and 1 GHz. The spectra exhibit a dielectric relaxation in the microwave region, subject to a small unsymmetric relaxation time distribution, and an extrapolated high frequency permittivity $\epsilon(\infty)$ which noticeably exceeds the squared optical refractive index n^2_D . The microwave relaxation is discussed in terms of acid-base complexes in the liquid, including proton transfer complexes. The dielectric spectra do not evidence a clear stoichiometric composition of the complex structures. The gap between $\epsilon(\infty)$ and n^2_D is assigned to significant contributions from atomic polarization and the dielectric dispersion due to the reorientational motions of dipolar acid and base molecules.

Adres publiczny

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