Section E2

601/E2

Determination of thermodynamic parameters of weak acids using a conductivity method

S Sinthuja, P Abiman, P Iyngaran, K Velauthamurty and R Srikaran

Department of Chemistry, University of Jaffna, Jaffna

Thermodynamic parameters of the ionization of aqueous benzoic acid, aqueous *o*-nitro benzoic acid and aqueous *o*-methoxy benzoic acid were determined using a conductivity method to investigate the reaction mechanism and the kinetics of the reaction. Conductivities of 0.00125 M, 0.0025 M, 0.005 M, 0.01 M and 0.02 M of benzoic acid, *o*-nitro benzoic acid and *o*-methoxy benzoic acid were measured at the temperatures 283 K, 293 K, 303 K, 313 K, 323 K and 333 K and corrected using the conductivity of distilled water at the respective temperature for the determination of the molar conductivities of each acid at each concentration at different temperatures. Corrected conductivity against inversion of molar conductivity was plotted for each electrolyte at each temperature and dissociation constants of benzoic acid, *o*-nitro benzoic acid and *o*-methoxy benzoic acid at six different temperatures were determined from the slope and the intercept of each line. The data were analyzed to give the enthalpy change, the Gibbs free energy change as well as the entropy change for the ionization process of these weak acids. At any temperature, dissociation constants decreased in the following order: *o*-nitro benzoic acid > *o*-methoxy benzoic acid > benzoic acid. The Gibbs free energy change for the ionization of the acids is positive, indicating the non spontaneity of the process. Further, the ln K_a versus 1/T plots showed negative enthalpy of ionization indicating the exothermic nature of the process.

ssinthu21@gmail.com Tel: 0212225041