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## Effect of NaCl and KCl on volumetric and acoustic behaviour of procaine hydrochloride in aqueous solution at different temperatures (288.15, 298.15 and 308.15) K

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### Abstract

Physical properties of aqueous solutions of drugs are required to assess the biological activity of that particular drug in treatment of the disease. The most important of the physical parameters are density and speed of sound. From this point of view, we have measured densities and speeds of sound of procaine hydrochloride (Procaine·HCl) in aqueous and in 0.06 mol·kg<sup>-1</sup> and 0.1 mol·kg<sup>-1</sup> aqueous solutions of sodium chloride and potassium chloride at three different temperatures *i.e.*  $T = (288.15, 298.15 \text{ and } 308.15) \text{ K}$  in the concentration range of (0.01 to 0.1) mol·kg<sup>-1</sup>. Density and speed of sound data were used to evaluate different thermodynamic properties such as apparent molar volume ( $V_\phi$ ) of solute, isentropic compressibility ( $\kappa_s$ ) of solution, apparent molar isentropic compressibility ( $\kappa_\phi$ ) of solute *i.e.* procaine hydrochloride (Procaine·HCl) in water and in aqueous solutions of 0.06 and 0.1 mol·kg<sup>-1</sup> sodium chloride and potassium chloride. The limiting apparent molar expansivity ( $E_\phi^0$ ) of procaine hydrochloride and coefficient of thermal expansion ( $\alpha^*$ ) of procaine hydrochloride have also been estimated. Infinite dilution values of  $V_\phi$  and  $\kappa_\phi$  were also obtained from extrapolation to zero molality and have been utilized in obtaining transfer volumes ( $\Delta_{tr}V_\phi^0$ ) and transfer compressibilities ( $\Delta_{tr}\kappa_\phi^0$ ) of procaine hydrochloride from water to aqueous solutions of 0.06 mol·kg<sup>-1</sup> and 0.1 mol·kg<sup>-1</sup> sodium chloride and potassium chloride at different temperatures. The results are interpreted in terms of different interactions between solute and solvent molecules (solute-solute and solute-solvent interaction).

**Keywords:** Density, Speed of sound, Procaine hydrochloride, Sodium chloride, Potassium chloride.

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