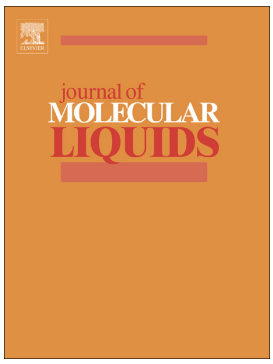

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Temperature dependent physicochemical studies of polyethylene glycols (PEG-400 and PEG-4000) in aqueous sorbitol solutions

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Abstract

From the measurements of density and speed of sound, the apparent molar properties and the partial molar properties have been determined to study the interactions of two polyethylene glycols i.e. polyethylene glycol 400 and polyethylene glycol 4000 in aqueous solutions of sorbitol at experimental pressure p = 0.1 MPa and temperatures T = (288.15-318.15) K. Evaluation of partial molar volume (V_ϕ^o), apparent molar volume (V_ϕ) and partial molar volumes of transfer (ΔV_ϕ^o) is done using density measurements. For the determination of partial molar isentropic compression ($K_{\phi,s}^o$), apparent molar isentropic compression ($K_{\phi,s}$), and partial molar isentropic compression of transfer ($\Delta K_{\phi,s}^o$), the ultrasonic speed measurements have been utilized. The limiting apparent molar expansibilities (E_ϕ^0) and its first order derivatives $(\partial E_\phi^0/\partial T)_p$ are also calculated. Further, with the aid of partial molar isentropic compression of transfer and partial molar volumes of transfer, pair and triplet coefficients are determined. Through the scrutiny of these evaluated parameters, the results are elucidated based upon contending patterns of physicochemical interactions of co-solutes and solvents prevailing in present ternary liquid mixtures.

Keywords: Speed of Sound, Density, Polyethylene Glycol, Apparent Molar Properties, Sorbitol

1. Introduction

Polyethylene glycols (PEGs), belong to the family of polymers, are the polyether compounds having considerable applications from manufacturing industry to pharmaceutical industry. Because of their low toxicity, they have salient clinical uses. They are exercised as the basis for many laxatives and skin creams [1]. As an electrolyte solvent and separator, PEG is castoff in polymer cells. It is also utilized as a dispersant in toothpastes, as a polar stationery phase in gas chromatography, by integrating with hydrophobic molecules it is practiced in the fabrication of non-ionic surfactants. Another stimulating usage of PEGs is in the preparation of edible films where they act as plasticizers [2]. Erol Ayranci *et al.* used PEGs with varying molecular weights for edible film preparations and their further utilization to foods [3, 4].