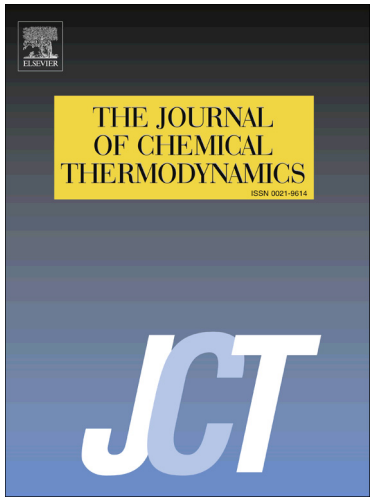

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A volumetric and acoustic study of pseudo-binary mixtures of (water + 1,3-propanediol + 3-butoxypropan-1-amine) from T = (283.15 to 303.15) K

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ABSTRACT

Due to the relevant role that polyols play either as solvents or additives in many industries thermodynamic properties of aqueous mixtures of these compounds have been largely studied. In this work we aim to study the effect of adding a small amount of 3-butoxypropan-1-amine on the volumetric properties of the binary (water +1,3-propanediol) mixture. Densities and speeds of sound of the ternary (pseudo-binary) mixture, (water +1,3-propanediol + 3-butoxypropan-1-amine), were measured at five different temperatures ranging from T = (283.15 to 303.15) K. Excess molar, volumes, isobaric expansions and isentropic compressions of the system, as well as the excess partial molar, volumes and isentropic compressions for water and 1,3-propanediol were derived. Some functions of transference of the 1,3-propanediol and water from the binary{water + 1,3-propanediol} to the ternary mixtures were estimated. The interpretation of the results was made in terms of changes in aggregation patterns and hydration.

Key words: pseudo-binary mixtures, aqueous solutions, density, sound speed, molecular interactions

1. Introduction

It is well known the importance of polyols, and in particular diols, in many domains. In biophysics and pharmaceutical industry they are used in preventing the denaturation of proteins and as additives to many drugs, food and cosmetic products because they have been considered compatible co-solvents for proteins [1-3]. In chemical industry and engineering they are used in the production of polyurethanes and polyethers [4,5]