Available online at **www.joac.info**

ISSN: 2278-1862

Journal of Applicable Chemistry

2019, 8 (3): 1417-1425

(International Peer Reviewed Journal)

Correlation between Experimental and Theoretical Ultrasonic Velocities in Binary Mixtures of Furfuryl Alcohol with Glycols at 303.15 K

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Accepted on 9th May, 2019

ABSTRACT

Ultrasonic velocities and densities of the binary liquid mixtures of Furfuryl alcohol with different glycols like ethylene glycol, diethylene glycol and triethylene glycol have been measured at temperature 303.15 K over the entire composition range. Various theories of ultrasonic velocity were applied to experimental values in evaluating the velocities using viz., Nomoto, impedance, Van Dael and Vangeel, Junjie, Rao and collision factor theories. Scaled particle theory is applied to these mixtures by considering different shapes viz., sphere, cube, tetrahedron, disc A, disc B, disc C and disc D for both the participating components i.e., Furfuryl alcohol with ethylene glycol, diethylene glycol and triethylene glycol. The combinations of different molecular shapes and thermodynamic states at 303.15 K are in close agreement between theoretically predicted ultrasonic velocities and the experimental values by using Nomoto and Scaled particle theories. The molecular interaction parameter (χ) has been evaluated from the values of experimental and theoretical velocities. The variation of this interaction parameter with the composition mixture has been discussed in terms of molecular interactions.

Highlights

- Binary liquid mixtures of Furfuryl alcohol with ethylene glycol, diethylene glycol and triethylene glycol are investigated.
- The experimental and theoretical ultrasonic velocities are correlated.
- In scaled particle theory the shapes and thermodynamic states of the molecules are considered.
- Scaled particle theory accurately predicted the speeds of sound in the mixtures studied.
- By determining standard deviation and by applying Chi-square test Statistical analysis is made.

Keywords: Ultrasonics, Thermodynamic parameters, Scaled particle theory, *Chi*-square.