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AN APPLICATION OF DERIVED NEW FORMULA (PDJ) FOR SPECIFIC REFRACTION TO BINARY MIXTURE OF METHANOL AND WATER AT 300K

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ABSTRACT

Refractive index and Density of Methanol, Water and binary mixture (Methanol + Water) in different proposition were measured at 300 K. Specific Refractions have been calculated by using measured refractive index and densities of solution. A comparative study of Lorenz and Lorentz, Patel Desai and Joshi (PDJ) have been investigated. Difference of specific refraction between Lorenz & Lorentz and suggested (PDJ) have been calculated and reported.

KEYWORDS: *Densities, Refractive index, Binary mixture, Lorenz and Lorentz, PDJ.*

INTRODUCTION

The literature reports several papers concerning density, viscosity, and refractive index for pure linear hydrocarbons, and derived properties, such as excess volume, viscosity deviation function, specific and molar refractivity, and refractivity deviation function for their binary mixtures with linear and nonlinear hydrocarbons**.** The measurement of refractive index of organic liquids and solutions is of great importance because it furnishes information about the molecular structure, purity of organic compounds and of the composition of binary Mixtures. Refractive indices of binary, ternary liquid solutions and the solutions of biologically important compounds have been studied.[1-7] The Specific Refraction of binary (Methanol + Water) mixture were determined using Lorenz and Lorentz equation[8], DDJ formula[9-10], CDJ formula[11], and Patel Desai and Joshi's formula.[12-13] In Present work investigated the specific refraction of binary (Methanol + Water) mixtures with Lorenz & Lorentz and suggested formula Patel Desai and Joshi (PDJ) formula at 300K and compared it.

MATERIALS AND METHODS

Binary (Methanol + Water) mixtures of different percentage were prepared by respective volume. Density measurement performed by using by specific gravity bottle with thermometer volume of 25 ml, it was calibrated by distilled water at 300 K. Weighing was done by the electronic balance. Solutions of 10%v/v, 20%v/v, 40%v/v and 60%v/v methanol were prepared by dissolving 10 ml, 20 ml, 40 ml, and 60 ml methanol in 90 ml, 80 ml, 60 ml, and 40ml. of distilled water in 100 ml. volumetric flask, and densities and refractive indices were measured and Refractive index of the percentage solutions were measured by using the Abbe's refractometer at constant temperatures at 300K.Calculate the Specific refraction by Lorenz & Lorentz and PDJ formula and also calculate the different between Lorenz & Lorentz and PDJ formula. Refractometer was calibrated with the glass piece provided with instrument.

Table-1: Experimental values of refractive index (n), density (d),and Specific refraction (R) (L&L and PDJ) of pure solvents and 10%v/v, 20%v/v, 40%v/v and 60%v/v (Methanol + water) mixture were measured at 300K.

Percentage Composition of (Methanol +Water)	Density (d)	Refractive index (n)	R_1 L&L	R_2 PDJ	Diff R_1-R_2
Methanol	0.7875	1.347	0.2711	0.2694	0.0017
Water	0.9965	1.352	0.2170	0.2153	0.0017
10% (v/v)M-W	0.9795	1.353	0.2214	0.2195	0.0018
20%(v/v)M-W	0.9814	1.355	0.2221	0.2201	0.0020
40%(v/v)M-W	0.9988	1.359	0.2204	0.2182	0.0022
60%(v/v)M-W	0.9945	1.361	0.2225	0.2201	0.0023

$$R_1 = \frac{n^2 - 1}{n^2 + 2} \cdot \frac{1}{d}$$ [Lorenz & Lorentz formula] ..... (1)

$$R_2 = \frac{n - 0.91}{2.06} \cdot \frac{1}{d}$$ [Suggested PDJ formula] ..... (2)

Where, R_1 & R_2 = Specific Refraction

n = Refractive Index

d = Density of solution

RESULTS AND DISCUSSION

Experimental density, refractive index and specific refraction by Lorenz & Lorentz and PDJ formula of pure solvents and 10%v/v, 20%v/v, 40%v/v and 60%v/v (Methanol + water)

mixture at 300K are reported in Table-1. Densities decreased with increase in the percentage of Methanol for approximately the same concentration of solutions which may be due to the weakening of ion-solvent interactions in higher percentage of methanol and increased in volume of system as methanol percentage increases. For given composition of binary (Methanol + water) mixture, refractive indices of the solutions increase with their concentration. Also for approximately same concentration of solution, refractive index increased with increase in percentage of (Methanol + water) mixture which is due to lower refractive index of methanol than water. Specific refraction of the solutions of 10%v/v, 20%v/v, 40%v/v and 60%v/v Methanol in (Methanol + water) mixture at 300K was calculated by Lorenz and Lorentz, PDJ equations.

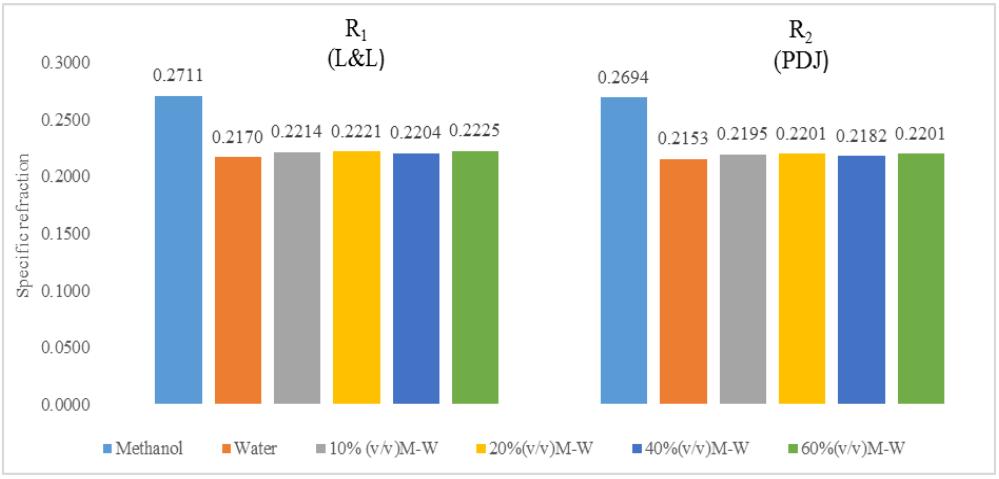

Fig -1 Comparison of Specific refraction values of various composition of binary (Methanol + Water) mixture of Lorenz & Lorentz and PDJ formula.

CONCLUSION

It can be observed that the calculated values of specific refraction by PDJ formula is nearly to the Lorenz and Lorentz formula. Hence, the PDJ formula give good applicability toward binary mixture.

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REFERENCES

1. P. H. Parsania, Experiments in Physical Chemistry, 2009.
2. M. V. Rathnam, S. Mohite, Journal of the Serbian Chemical Society, 2012, 77,507-521.
3. Arce, E. Rodii, A. Soto, Journal of Solution Chemistry, 1998; 27(10): 911-923.
4. R. Talegaonkar, A. S. Burghate, S. A. Wadal, Oriental Journal Of Chemistry, 2011; 27(3): 1285–1288.
5. P. Baraldi, M. G. Giorgini, D. Manzini, A. Marchetti, L. Tassi, Journal of Solution Chemistry, 2002; 31(11): 873–893.
6. Arce, E. Rodil, and A. Soto, Journal of Chemical and Engineering Data, 1997; 42(4): 721–726.
7. N. Sonar and N. S. Pawar, Rasayan Journal of Chemistry, 2010; 3(2): 250–254.
8. Lorenz, Lorentz, Ann. Phys., 1880; 11: 70.
9. K. P. Damor, K. V. Goswami, S. P. Vyas, Journal of chemical and pharmaceutical research, 2014; 6(11): 750-752.
10. P. Damor, S. P. Vyas, K. V. Goswami, ISOR, 2014; 7(12): 48-51.
11. M. R. Chavda, Z. M. Gadhawala, S. S. Andher , H. D. Joshi, Journal of institution of Chemists, 2008; 82(2): 42-44 .
12. H. K. Patel, Journal of chemical and pharmaceutical research, 2015; 7(2): 908-909.
13. H. K. Patel, Scholars Research Library, 2015; 7(3): (Accepted).