

Molar Polarization of Binary Mixture

R..Suganya, C.Radhika

Department of Physics, Bharath Institute of Higher Education and Research, Chennai, India

Department of Physics, Bharath Institute Of Higher Education And Research, Chennai, India

ABSTRACT: An experimental approach to check the validity of velocity and nature of molecular interactions in a binary mixture.

KEYWORDS: Xylene, Acetone, Binary mixture

I.INTRODUCTION

There has been a continuous and growing interest in the study of liquids and their mixtures using ultrasonic parameters employing ultrasonic technique. The ultrasonic parameters are helpful than spectroscopic data in the study of interactions among component molecules of liquid mixtures. An attempt is made to study the binary mixtures by ultrasonic technique and also the validity of some of the mixing rules for ultrasonic velocity of the liquid mixture is checked.[1-3].

II.THEORY

The liquid state of matter is known to being intermediate between those of solids and gases. Binary liquid is a type of chemical combination, which creates a special reaction or feature as a result of two liquid chemicals, normally inert or having no function by themselves, being mixed. A number of chemical products are produced as a result of mixing two chemicals as a binary liquid. A mixture is a system that is analyzed in terms of two or more different entities. Physical parameters such as melting point, vapor pressure, Index of refraction, density, viscosity and internal pressure characteristic the properties of solvent. Of these the dielectric constant plays a particular role in characterization of solvents. In the Polar solvents the molecule make up by two or more different elements. The molecule should be asymmetrical. (asymmetrical mean the shape which two sides are different.).

Polar solvents are ones that have a strong dipole moment. Therefore, polar solvent are good at stabilizing polar or charged transition states and intermediates. Usually, polar solvents will have one or more electronegative atoms. These solvents have moderately higher dielectric constants than the non polar solvents (between 5 and 20). Since they have intermediate polarity they are good “general purpose” solvents for a wide range of reactions[4-6]

Non polar solvents contain bonds between atoms with similar electro negativities. Bonds between atoms with similar electro negativities will lack partial charges; it's this absence of charge which makes these molecules “non-polar”. Non polar solvents have low dielectric constants (<5) and are not good solvents for charged species such as anions.

There are two common ways of measuring this polarity. One is through measuring a constant called “dielectric constant”. The greater the dielectric constant, the greater the polarity. A second comes from directly measuring the dipole moment.[7-9]

Molecules whether polar or non polar are electrical in nature due to the presence of nuclei and electrons. They are neutral because their net charge is zero, the number of nuclear charges being equal to the number of electronic charges. In the case of non polar molecules, the centers of positive and negative charges coincide. However, when such a molecule is placed in an electric field, there is a displacement of electric centers. The center of positive charges shifts towards one end

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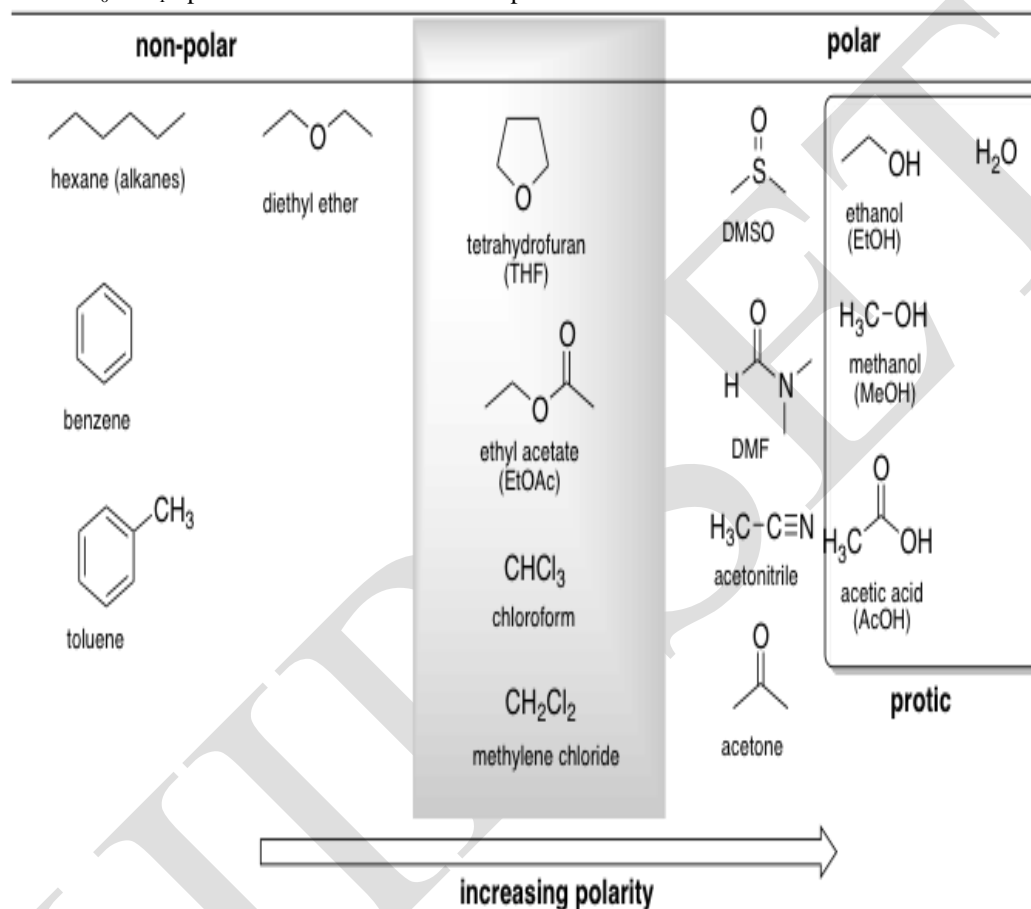
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while that of negative charges shifts towards the other end of the molecule. As a result, a dipole is induced in the molecule. This is called distortion polarization. Polar molecules have a permanent dipole. Such molecules are said to have orientation polarization. Thus total polarization 'P' in such case is given by

$$P = P_0 + P_1$$

Where P_0 & P_1 represent orientation & induced polarization.



MOLAR POLARIZATION

Mosotti derived an equation for a quantity called molar polarization P_m which includes properties of experimental measurement. This equation is,

$$P_m = \frac{D-1}{D+2} \cdot \frac{M}{\rho}$$

The quantity is independent of temperature in case of polar molecules. The induced polarization in such a case would be only due to distortion of electronic charge. According to mosotti equation

$$P_e = \frac{n_2^2 - 1}{n_2^2 + 2} \cdot \frac{M}{\rho}$$

Since P_0 is greater than zero, there exist a orientation polarization. So, Acetone is a polar liquid and xylene is a non polar liquid.

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 3, Issue 11, November 2014

Component	Dielectric constant	Density $\frac{g}{cm^3}$	Molecular weight	Molar Polarization	Induced Polarization	Orientation polarization
Acetone (C ₃ H ₆ O)	20.7	0.7856	58.08	64.15	16.267	47.88
Xylene (C ₈ H ₁₀)	2.27	0.8610	106.1	36.67	36.05	0.613

IV.RESULT & DISCUSSION

The magnatidue and the sign of the excess values like adiabatic compressibility, free volume and internal pressure etc,gives a better understanding about the strength of interactions among component molecules in liquid mixtures.For example the various type of interactions which operate between molecules of different systems are dispersion forces which make a positive contribution to the values of internal pressure while charge transfer, dipole induced dipole interactions and hydrogen bonding are expected to give negative contribution.

REFERENCES

- 1.Mossotti, O. F. (1850). *Mem. di mathem. e fisica in Modena.* 24 11. p. 49.
2. Shanthi B., Revathy C., Devi A.J.M., Parameshwari P.J., Stephen T., "Serum 25(OH)D and type 2 diabetes mellitus", *Journal of Clinical and Diagnostic Research*, ISSN : 0973 - 709X, 6(5) (2012) pp.774-776.
3. Madhubala V., Subhashree A.R., Shanthi B., "Serum carbohydrate deficient transferrin as a sensitive marker in diagnosing alcohol abuse: A case - Control study", *Journal of Clinical and Diagnostic Research*, ISSN : 0973 - 709X, 7(2) (2013) pp.197-200.
4. Christian Lawler and Michael D. Fayer *The Journal of Physical Chemistry B* **2015** 119 (19), 6024-6034
5. Khanaa V., Thooyamani K.P., Saravanan T., "Simulation of an all optical full adder using optical switch", *Indian Journal of Science and Technology*, ISSN : 0974-6846, 6(S6)(2013) pp.4733-4736.
6. Nagarajan C., Madheswaran M., "Stability analysis of series parallel resonant converter with fuzzy logic controller using state space techniques", *Electric Power Components and Systems*, ISSN : 1532-5008, 39(8) (2011) pp.780-793.
- 7.Puri & Sharma Principles of physical chemistry
8. Bhat V., "A close-up on obturators using magnets: Part I - Magnets in dentistry", *Journal of Indian Prosthodontist Society*, ISSN : 0972-4052 , 5(3) (2005) pp.114-118.
- 9.Hand book of chemistry and physics David R. Lide
10. Dr.V.Krishnasamy, S.Rosy Christy, SUBSTITUTED AROMATIC ANILS - A KINETIC STUDY USING PYRIDINIUM CHLOROCHROMATE (PCC), *International Journal of Biotech Trends and Technology (IJBT)*, ISSN: 2319-8753,pp 495-499 ,Vol. 2, Issue 2, February 2013
11. DR.V.Krishnasamy, S.Rosy Christy, KINETICS OF OXIDATION OF AROMATIC ANIL BY PYRIDINIUM DICHROMATE – STUDY OF THE EFFECTS OXIDANTS AND SUBSTRATE, *International Journal of Biotech Trends and Technology (IJBT)*, ISSN: 2319-8753,pp 298-302, Vol. 2, Issue 1, January 2013
12. Mrs.Shanthi &Dr.A.Mukunthan, Nucleation kinetics of L-Alanine acetate, *International Journal of Innovative Research in Science, Engineering and Technology*, ISSN: 2319-8753,pp 2650-2653, Vol. 2, Issue 7, July 2013
13. Mrs.V.G.Vijaya, DESIGN AND FABRICATION OF SEQUENCING CIRCUIT WITH SINGLE DOUBLE ACTING CYLINDER, *International Journal of Computer Trends and Technology(IJCTT)*, ISSN: 2319-8753,pp 6315-6322, Vol. 2, Issue 11, November 2013
14. Bharthvajan R, A STUDY ON THE EFFECTIVENESS OF SALES INCENTIVES IN IMPROVING SALES PERFORMANCE, *International Journal of Computer & Organization Trends (IJCOT)*, ISSN: 2319-8753,pp 10931-10933, Vol. 3, Issue 4, April 2014