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STUDY THE EFFECT OF SOLVENT ON MOLAR REFRACTION AND POLARIZABILITY CONSTANT OF CLARITHROMYCIN SOLUTION AT 303.15 K.

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ABSTRACT
The molar refraction and molar polarizability constant of substituted heterocyclic drugs Clarithromycin in different solvent like Ethanol, Methanol, Carbon tetrachloride, DMF, Dioxane and THF medium at 303.15 K at different concentrations were studied. The values of molar refraction (Rm) and molar polarizability (α) constant are found to be decreased with decreasing concentration of solute in solvent and drug –solvent interaction in different solvent has been observed.

KEY WORDS: Refractive index, Molar refraction and Molar polarizability constant.

INTRODUCTION

The refractive index is one of a unique and important property of liquid. The measurement of refractive index of organic liquids is of great importance in chemistry. These measurements provide valuable information regarding molecular structure, purity of organic compound and composition of binary mixtures. This study is an important tool for Drug-solvent interactions in medical and pharmaceutical sciences. When a light of beam passes from one substance to another, the beam is bending so that it travels in different direction. If it is passed from less dense to high denser medium it is refracted toward normal to form angle of refraction which is less than angle of incident. The refractive index is the ratio of angle of incident to the angle of refraction. It depends on the temperature and wave length of light. The extent of refraction depends on- i) The relative concentration of atom or molecule ii) The structure of atom or molecule. So refractive index gives idea about geometry and structure of molecule. Refraction of light is additive property, but also depends on the structural arrangement of atom in molecule. Some time, this can be used to determine the structure of an unknown compound whose molecular formula is known. Clarithromycin is most important substituted heterocyclic drug. Clarithromycin is beneficial for treat a number of bacterial infections including pneumonia, Helicobacter pylori, and also alternative to penicillin in strep throat.[1] Tayade et al[2] have been studied the refractometric measurements of 5-o-tolylthiocarbamido-1-naphthol in 55% ethanol-water system at 303 K by Abbe's refractometer. The solvent effects on molar refraction and polarizability of 4-amino-5-chloro-N-(2-(diethylamino) ethyl)-2 methoxybenzamide hydrochloride hydrate solutions at 303 K have been studied by Deosarkar et al.[3] The refractive index, molar refraction and polarizability constant of various compounds were studied by many workers.[4-7] Sangita Sharma[8] has been studied density and refractive index of binary liquid mixture Eucalyptol with Hydrocarbon at different temperature. Oswal[9] has been studied refractivity properties of some homologous series such as n-ethanoate, methyl alkanoates, ethyl alkanoates etc. were measured in the temperature range from 298.15 to 333.15 K. Yangang Liu[10] has studied relationship of refractive index to mass density and consistency of the mixing rule use to calculate these two quantities of multi component mixture like ambient aerosols with the index-density relationship. Yadava[11] has studied refractive indices of binary mixture of bromoalkane and non polar hydrocarbons, also studied molecular interaction between the components of binary mixtures. Sonune[12] has been studied additive properties such as molar refractivity and molar polarizability constant of allopurinal, acenocoumarol, warfarin and amoxicillin in different media. The number of researchers have been studied the molar polarization and polarizability of drugs in different solvent.[13-16]

However, study of molar refractivity and molar polarizability constant of substituted heterocyclic drugs Clarithromycin in non aqueous solvent such as ethanol, methanol, Carbon tetrachloride, DMF, dioxane and THF under identical set of experimental condition. This could cover manifold aspect of solute-solvent interactions scanty. Therefore, the present work is undertaken to

make the systematic study of above substituted heterocyclic drugs refractometrically at 25°C.

MATERIAL AND METHODS

All the chemicals used are of good analytical grade (AR). The solutions of various concentrations of substituted heterocyclic drugs were prepared by dissolving required amount of solute in different solvents like ethanol, methanol, and Carbon tetrachloride, DMF, Dioxane and THF. The density of pure solvent and solutions were measured by specific gravity bottle having 10 ml capacity at 303.15 K. The refractive indices of solvent mixture and solutions were measured by Abbe's refractometer at (30 ± 0.1°C). The accuracy of Abbe's refractometer was within ±0.001 units. The constant temperature of theprism box is maintained by circulating water from thermostat at 30°C± 0.1°C. Refractometer was calibrated by using glass test piece of known refractive index supplied with the instrument. The molar refraction of solvent and solution are determined by using Lorentz-Lorentz equation. The calculated values of molar refraction and molar polarizability constant shown in table-1for different system.

RESULT AND DISCUSSION

The measured values of density and refractive index of substituted heterocyclic drugs increases with increase in concentration of ligand in different solvents. The values of molar refraction (R_m) and molar polarizability constant (α) of all ligands are found to be greater in polar protic solvents like ethanol, methanol than polar aprotic solvents like THF, DMF and non polar solvents like dioxane, carbon tetrachloride. This is due to the ability of formation of hydrogen bonding of polar protic solvents may form complex with solute but polar aprotic and non polar solvents does not contains H-bonding and it does not form complex with solute. This may be characteristics to the fact that the dipole in the compound lies perpendicular to the longer axis of the molecule, which shows intermolecular attraction take place. This will be accompanied by increase the value of molar refraction and molar polarizability constant with increasing concentration of solution because of mutual compensation of dipoles. From table-1, it could be seen that molar refractivity and molar polarizability constants decreases with decreasing in the concentration of solution.

Table-1: Molar polarization and polarizability constant (Clarithromycin).

Conc^n in Moles/lit.	Medium					
	Ethanol		Methanol		CCl_4	
	$R_m x10^3$ cm^3/mole	α x10^{-23} cm^3	$R_m x10^3$ cm^3/mole	$\alpha x10^{-23}$ cm^3	$R_m x10^3$ cm^3/mole	$\alpha x10^{-23}$ cm^3
10 x10^{-3}	0.2147	8.51	0.2040	8.08	0.1303	5.16
5 x10^{-3}	0.1064	4.22	0.1014	4.02	0.0647	2.57
2.5 x10^{-3}	0.0527	2.09	0.0503	1.99	0.0323	1.28
1.25 x10^{-3}	0.0262	1.04	0.0257	0.99	0.0161	0.64
0.625 x10^{-3}	0.0130	0.52	0.0125	0.49	0.0079	0.32

Conc^n in Moles/lit.	Medium					
	DMF		THF		Dioxane	
	$R_m x10^3$ cm^3/mole	α x10^{-23} cm^3	$R_m x10^3$ cm^3/mole	$\alpha x10^{-23}$ cm^3	$R_m x10^3$ cm^3/mole	$\alpha x10^{-23}$ cm^3
10 x10^{-3}	0.1648	6.53	0.2062	8.17	0.1904	7.55
5 x10^{-3}	0.0819	3.25	0.1026	4.06	0.0949	3.76
2.5 x10^{-3}	0.0408	1.61	0.0511	2.02	0.0475	1.88
1.25 x10^{-3}	0.0203	0.80	0.0255	1.01	0.0237	0.94
0.625 x10^{-3}	0.0101	0.399	0.0127	0.502	0.0117	0.46

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