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SUDIES ON REFRACTIVE INDEX OF SOME SUBSTITUTED HETEROCYCLIC COMPOUNDS IN DIFFERENT MEDIA

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ABSTRACT

Refractive index , molar polarizibility constant and molar refractivities of Lincomycin, Quinine and Folic acid have been studied in DMF, THF, Ethanol and DMSO media at 27°C(±0.1°C) temperature and at different concentrations(0.63 x 10^{-3} M to 10.0 x 10^{-3}M). The data obtain was utilized to calculate molar refraction and polarizibility constant which explain solute-solvent , solvent- solvent interactions.

KEY-WORDS: Refractive index, molar polarizibility constant and molar refractivities.

INTRODUCTION:

Refractive index is one of the most important properties of liquid. When a ray of light passes from less dense to denser medium then there is a change in direction of refraction and also angle of refraction changes and ultimately the refractive index changed. The result obtained during this investigation directly through light on the dipole association of ligand intermolecuar attraction between solution and solvent, dielectric constant of medium, polarizability and mutual compen- sation of dipole. These results are much more useful for transmission, stability activity and effect of drug hence, this study is essential.

Sangita Sharma et.al.[1]has been studied density and refractive index of binary liquid mixture Eucalyptol with Hydrocarbon at different tempera- ture. Oswal et.al.[2] have studied dielectric constants and refractive indices of binary mixtures of ethyl acetate with toluene ethyl benzene, o-xylene , p-xylene and p-dioxane. Oswal et. al.[3] have been studied refractivity properties of some homologous series such as n-ethanoates , methyl alkanoates, ethyl alkanoates etc. were measured in the temperature range 298.15 to 333.15 °K . Sonar et. al.[4] have been studied refractivity of some heterocyclic compounds at 303oK.Ubarhande et.al.[5] have been studied refractive index of 1,3 diaryl carbamides in different percentage of binary liquid mixture. A.M. Kshirsagar et.al.[6] have been studied refractometry of S-trizinothiocarbamides in different percentage of dioxane-water mixture. Deosarkar et.al.[7] have been study about drug-amino acid interactions of gylcine and aq. isoniazid

ternary mixtures.

Therefore the present work is undertaken to make systimatic study of molar refractivity, molar polarizability of substituted heterocyclic compounds such as Lincomycin ,Quinine and Folic acid in non aqueous solvents such as DMF, THF, Ethanol and DMSO under identical set of experimental condition refractometrically at 300oK.

Experimental

Above all substituted heterocyclic compounds have most importance. The solution of above compounds are prepared in different solvent like DMF, THF, Ethanol & DMSO by dissolving an appropriate amount by weight . For density measurement all the weight took on Contech balance(0.001gm.). The refractive index of solvent & solutions are measured at different concentrations (0.625×10^{-3} to 10×10^{-3}M) by Abbe's Refractometer having accuracy with ±0.01 unit. The constant temperature of the Prism box is maintained by circulating water from Thermostat at 300oK . Refractometer was calibrated using glass test piece of known refractive index supplied with the instrument.

The molar refraction of solvents & solution mixture are determined from ,

$$Rm = [(n^2+1)/(n^2-1)]m/d = 4\pi No\,\alpha \text{----------(1)}$$

$$Rm(solution) = X_1Rm_1+X_2Rm_2 \text{----------(2)}$$

where Rm →molar refraction, n → refractive index, d →density of solution ,

N_o→Avogadro' s number , α → polarizibility constant,

Rm_1 & Rm_2 →molar refractivity of solvent & solute and

X_1 & X_2 → mole fraction on solvent & solute in solution.

The molar refraction represents actual or true volume of the substance molecules in mole. The molar refraction of solute can be calculated as :

Rm(solute) = Rm(mixture) - Rm(solvent) ----------(3)

The refractive index of solvents and solutions at different concentrations are measured from Abbe's refractometer and the values of molar refractions and polarizibility constants are evaluated and presented in tables 1 to 3 for different systems.

Observations and Calculations:

Table 1 : System : Lincomycin

Conc^n. in mole/liter	Medium							
	DMF		THF		Ethanol		DMSO	
	Rm	α x 10^{-26}	Rm	α x 10^{-26}	Rm	α x 10^{-26}	Rm	α x 10^{-26}
10 X 10^{-3}	0.1043	4.130	0.1041	4.159	0.1072	2.540	0.0993	3.938
5 X 10^{-3}	0.0492	1.950	0.0514	2.226	0.0528	2.096	0.0488	1.931
2.5 X 10^{-3}	0.0251	0.995	0.0277	1.096	0.0258	1.025	0.0241	0.956
1.25X 10^{-3}	0.0124	0.492	0.0138	0.548	0.0126	0.497	0.0119	0.444
0.625X 10^{-3}	0.0061	0.243	0.0068	0.272	0.0062	0.245	0.0058	0.229

Table 2 : System : Quinine.

Conc^{n}. in mole/liter	Medium							
	DMF		THF		Ethanol		DMSO	
	Rm	$\alpha \times 10^{-26}$	Rm	$\alpha \times 10^{-26}$	Rm	$\alpha \times 10^{-26}$	Rm	$\alpha \times 10^{-26}$
10×10^{-3}	0.1058	4.196	0.1131	4.488	0.0926	3.673	0.8647	3.429
5×10^{-3}	0.0591	2.059	0.0545	2.163	0.0450	1.783	0.0420	1.665
2.5×10^{-3}	0.0278	1.103	0.0265	1.052	0.0220	0.873	0.0202	0.804
1.25×10^{-3}	0.0123	0.489	0.0129	0.515	0.0108	0.426	0.0098	0.391
0.625×10^{-3}	0.0061	0.244	0.0063	0.251	0.0052	0.207	0.0047	0.187

Table 3 : System : Folic Acid.

Conc^{n}. in mole/liter	Medium							
	DMF		THF		Ethanol		DMSO	
	Rm	$\alpha \times 10^{-26}$	Rm	$\alpha \times 10^{-26}$	Rm	$\alpha \times 10^{-26}$	Rm	$\alpha \times 10^{-26}$
10×10^{-3}	0.1618	6.410	0.1257	4.985	0.1407	5.578	0.1363	5.404
5×10^{-3}	0.0794	3.152	0.0645	2.558	0.0683	2.707	0.0632	2.505
2.5×10^{-3}	0.0388	1.539	0.0314	1.246	0.0330	1.306	0.0315	1.210
1.25×10^{-3}	0.0188	0.745	0.0151	0.602	0.0160	0.632	0.0151	0.598
0.625×10^{-3}	0.0091	0.362	0.0075	0.291	0.0077	0.306	0.0073	0.287

Result and Discussion

It could be seen from above table no. 1 to 3 that molar refractivity and polarizibility constants decreases with decreasing the concentration of solution. This may be characteristics to the fact that the dipole in the compound lies perpendicular to the longer axis of the molecule shows intermolecular attraction take place which will be accompanied by increase the value of molar refraction and molar polarizibility constant with increasing concentration of solution because of mutual compensation of dipoles.

Sonar et.al .[4], Ubale et.al.[8], Burghate et.al[9], Agrawal et. al .[10] have been reported such results.

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