Studies in Additive Properties Such as Molar Refractivities and Molar Polarizibility Constant of Some Substituted Drugs with Different Concentration in Various Media.

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Abstract

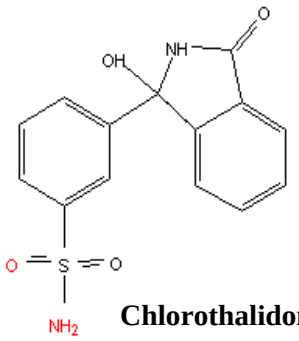
The additive properties such as Refractive index, Molar polarizibility and molar refractivities of some heterocyclic drugs such as Chlorothalidon -2-chloro-5-(1-hydroxy-3-oxo-1,2-dihydroisoindol-1-yl)-benzenesulfonamide.. Doxycycline i.e. 4-(dimethyl amino) 1,4,4a,5,5a,6,11,12a octahydro 3,6,10,12,12a Pentahydroxyl-1,11-dioxo naphthacence-2-carboxamide .have been studied in DMSO, DMF and THF media at 27±0.1^{0}C temperature and concentration. The values of molar refractivity(R) and molar polarizibility (α) are found to be decreased with decreasing the concentration of solute.

Key wards: Additive property, Doxycycline

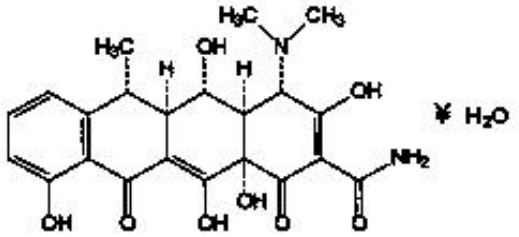
Introduction-

Refractive index is one of the important additives properties of liquid. When a ray of light passes from one medium to another, it suffers to refraction, that is a change of direction. If it passes from less dense to more dense medium, it is reflected towards the normal to form angle of refraction (r) which is less then angle incidence (i).The refractive index is the ratio of the velocity of light in vacuum to that in the medium and it depends upon the temperature and wave length of light. The properties of liquid such as refractive index, viscosity and ultrasonic velocity of binary mixtures are studied by many workers[1-3]. Mahajan[4] has studied molar refraction and polarizability constant of 2-amino-5-chloro benzene sulphonic acid in different percentage of dioxane-water mixture. Burghate[5] and Agrawal[6] studied the refractive indices in mixed solvents. Oswal et al[7] have studied dielectric constants and refractive indices of binary mixtures.Ikhe[8] has studies molar refraction and polarisability constant of pyrazoles and isoxazoles in different percentage of dioxane-water mixtures. Meshram et al[36] studied the molar refraction and polarizibility constant of Al(III), Ce(III) and Fe(III) complexes with some substituted isoxazolines, pyrazole and pyrazoline refractometrically. However study of molar refractivity and molar polarizibility constant of novel compounds such as

Chlorothalidon- 2- chloro -5- (1- hydroxyl -3- oxo- 1,2- dihydroisoindol -1- yl) - benzenesulfonamide and **Idoquinol**-5.7 di-iodo-8 – quinolinol in non aquous solvent such as THF,DMF and DMSO under identical set of Experimental conditions which could cover manifold aspect of solute-solvent interaction is scanty.



Chlorothalidon



Doxycycline

Therefore the present work is undertaken to make the systematic study of above novel compounds refractometrically at 27^0C temperature.

Experimental:

Above novel compound are extensively used as drugs in pharmaceutical. These compounds provide the photographic material with good storage stability even at high temperature and high humidity. The compounds are synthesized by standard method and purity is checked by M.P, TLC, IR, and NMR.etc. The solution of the compounds are prepared in different solvents (THF,DMF,DMSO etc.) by dissolving an appropriate amount by weight. All the weighing are made on Mechaniki Zactady Precyzying Gdansk balance made in Poland (±0.001gm).The accuracy of density measurements is within 0.1Kg/m^{-3}. The refractive index of solvent and solutions are measure at different concentrations by Abbe's refractometer having accuracy with (±0.01unit) .The temperature of prism box maintained constant by circulating water form thermostat at 27± 0.1^0C.Refractometer is initially calibrated with glass piece (n=1.5220) provided with the instrument.

The molar refraction of solvent and solution mixtures are determined from

$$Rm = \left(\frac{n^2+1}{n^2-1}\right)\frac{M}{d}$$

$$Rm_{(solute)} = X_1Rm_1 + X_2Rm_2$$

Rm ⟶ molar refraction, n⟶ refractive index, d ⟶ density of solution,

No ⟶ Avogadro's number, α ⟶ polarizibility constant,

Rm1 & Rm2 ⟶ molar refractivity of solvent and solute and

X1 & X2 ⟶ mole fraction of solvent and solute in solution.

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

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

The refractive index of solvent and solution at different concentration are measured from Abbe's refractometer and the values of molar refraction and polaribility constants are evaluated and presented in Tables 1 to 4 for different systems.

Table 1 Molar refraction and polarizibility constant for Ligand 1 (Chlorothalidon) in DMF

Molarity (M)in moles/liter	R.I.	Rm (cm^3 $mole^{-1}$)	α x 10^{-23} cm^3
0.01	1.321	0.1499	0.005975
0.005	1.320	0.07537	0.002903
0.0025	1.318	0.01637	0.0006309
0.00125	1.316	0.009546	0.0003677
0.000625	1.315	0.004794	0.0001847

Molar refraction and polarizibility constant for Ligand 1(Chlorothalidon) in THF

Molarity (M)	R.I.	Rm(cm^3 $mole^{-1}$)	α x 10^{-23} cm^3
0.01	1.467	0.1207	0.004654
0.005	1.466	0.06144	0.002367
0.0025	1.464	0.03114	0.001199
0.00125	1.463	0.01573	0.000606
0.000625	1.462	0.007430	0.0003055

Molar refraction and polarizibility constant for Ligand 1(Chlorothalidon) in DMSO

Molarity (M)	R.I.	Rm (cm^3 $mole^{-1}$)	α x 10^{-23} cm^3
0.01	1.360	0.1611	0.006207
0.005	1.359	0.08118	0.003127
0.0025	1.357	0.04095	0.001577
0.00125	1.355	0.02073	0.0007986
0.000625	1.354	0.01043	0.00040199

Molar refraction and polarizibility constant for Ligand2(.. Doxycycline) in DMF

Molarity (M)	R.I.	Rm(cm^3 $mole^{-1}$)	α x 10^{-23} cm^3
0.01	1.421	0.1243	0.004788
0.005	1.420	0.06262	0.002412
0.0025	1.419	0.03142	0.001210
0.00125	1.418	0.01584	0.0006102
0.000625	1.417	0.002670	0.000102

Molar refraction and polarizibility constant for Ligand 2(Doxycycline) in THF

Molarity (M)	R.I.	Rm (cm^3 $mole^{-1}$)	αx10^{-2} cm^3
0.01	1.468	0.08094	0.003118
0.005	1.467	0.04058	0.001563
0.0025	1.467	0.02003	0.0007827
0.00125	1.466	0.01018	0.0003940
0.000625	1.464	0.005201	0.00006570

Molar refraction and polarizibility constant for Ligand 2(.. Doxycycline) in DMSO

Molarity (M)	R.I.	Rm (cm^3 $mole^{-1}$)	α x 10^{-23} cm^3
0.01	1.363	0.08584	0.003306
0.005	1.362	0.04517	0.001740
0.0025	1.360	0.02286	0.0008807
0.00125	1.358	0.01153	0.0004442
0.000625	1.356	0.005805	0.0002236

Result and Discussion:

it could be seen from above Tables (1 to 4) thatmolar refractivity and polarizibility constants decrease with decreasing the concentration of solution. It is also observed that the values of Rm and α are found to be grater in polar solvents, .THF and DMF. Polar solvents involve H-bonding, may from complex with solute and non polar solvent does not involve H-bonding and does not associate with solute. This may also be attribute to the fact that the dipole in the compound lies perpendicular to the longer axis of the molecules considerable dipole association (inter molecular attraction) takes place which would be

accompanied by increase in polarizibility constants (α) as well as molar refractions (Rm) with increasing the concentration because of mutual compensation of the dipoles.

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