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PHYSICAL PARAMETER STUDY OF HETEROCYCLIC ANTIEMATIC AND ANTI-INFLAMMATORY DRUGS BY REFRACTOMETRY.

G.U. Belokar and A.S. Burghate
P.G. Department of chemistry Shri Shivaji science collage Amravati-444603 (MS)
*E-mail: gaurisolanke @gmail.com.

ABSTRACT
Polarisability constant and molar polarization for heterocyclic antiemetic and anti-inflammatory drugs in binary solvent mixture ethanol-water methanol water and DMSO-water determined by measurement of refractive index.
Keywords: heterocyclic antiemetic and anti-inflammatory drugs such as ondensetron hydrochloride, granisetron hydrochloride and ketorolac tromethamine, refractive index molar refraction, polarisability constant.

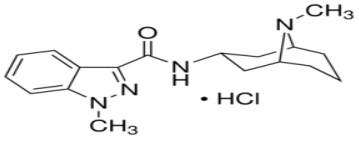
INTRODUCTION

Refractive index is one of the most important properties of liquid. Refractive index of liquid solutions can be easily and rapidly achieved by using Abbe's refractometer. Oswal *et al.*[1] have studied dielectric constants and refractive, indices of binary mixtures of ethyl acetate with toluene ethyl benzene, *o*-xylene, *p*-xylene and *p*-dioxane. Many workers[2-3] were studied the properties of liquid such as viscosity, refractive index of binary mixtures.

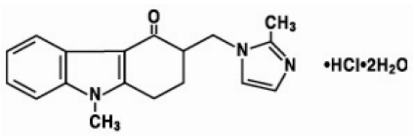
A. S. Burghate *et, al.*[4] have studied molar refraction and polarisability constant of 2- hydroxyl-5- methyl-4methoxy chalcone in different percentage of water. S. S. Ubarhande *et al.*[5] have studied on refractive index of 1, 3-diaryl carbamides in different percentage of binary liquid mixture. Rupali Talegaonkar *et. al.*[6] have studied molar refraction and polarisability constant of substituted thiazolyl Schiff's bases from refractive index measurement in different media. Refractive index, molar refraction and polarisability constant of various compounds were studied by many workers[7-10].

EXPERIMENTAL

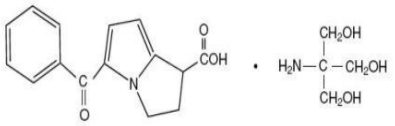
The present communication deals with the study of molar refraction and polarisability constant of heterocyclic antiemetic and anti-inflammatory drugs such as granisetron hydrochloride, ondensetron hydrochloride and ketorolac tromethamine. These drug molecules were provided by Wockhardt limited, Aurangabad.



Granisetron hydrochloride.



Ondensetron hydrochloride.



Ketorolac tromethamine.

Granisetron hydrochloride and ondensetron hydrochloride are the antiemetic drugs where as ketorolac tromethamine is anti-inflammatory.

The solutions of varying compositions of ethanol-water, methanol-water and DMSO-water (with different percentage) were prepared by dissolving as appropriate amount by weight. For density measurement, all the weightings were made on contech balance having accuracy (0.001 gm). The refractive index of solvent mixture/solutions was measured for different percentage by Abbe's refractometer. The temperature of prism box maintained constant by circulating water from thermostat maintained at 30° (+0.1°C). Initially, the refractometer was calibrated with a glass piece (n=1.5220) provided with the instrument.

Table-1: Values of molar refraction and polarisability constant at 306 k.
System: Granisetron hydrochloride.

% of solvent	Ethanol-water		Methanol-water		DMSO-water	
	R_M m^3/mole	$\alpha X10^{-23}$ m^3	R_M m^3/mole	$\alpha X10^{-23}$ m^3	R_M m^3/mole	$\alpha X10^{-23}$ m^3
50%	7.52849	0.29861	5.58382	0.22147	10.47693	0.41555
60%	8.517	0.33781	5.92577	0.23504	12.21147	0.48435
70%	9.45122	0.37487	6.37294	0.25277	13.8472	0.54923
80%	10.4562	0.41473	6.85577	0.27192	15.53805	0.61629
90%	11.5732	0.4590	7.38932	0.29309	17.06607	0.6769

Table-2: Value of molar refraction and polarisability constant at 306 k
System: Ondensetron hydrochloride.

% of solvent	Ethanol-water		Methanol-water		DMSO-water	
	R_M m^3/mole	$\alpha X10^{-23}$ m^3	R_M m^3/mole	$\alpha X10^{-23}$ m^3	R_M m^3/mole	$\alpha X10^{-23}$ m^3
50%	7.33639	0.29099	5.53221	0.21943	10.51646	0.41712
60%	8.23484	0.32861	5.91359	0.23455	12.00076	0.47599
70%	9.57898	0.37994	6.33533	0.25128	13.53368	0.53679
80%	10.15316	0.40271	6.81235	0.2702	15.21432	0.66345
90%	11.36045	0.4506	7.33571	0.29096	16.95338	0.67243

Table-3:Value of molar refraction and pol arisbility constant at 306 k
System: Ketorolac Tromethamine.

% of solvent	Ethanol-water		Methanol-water		DMSO-water	
	R_M m^3/mole	$\alpha X10^{-23}$ m^3	R_M m^3/mole	$\alpha X10^{-23}$ m^3	R_M m^3/mole	$\alpha X10^{-23}$ m^3
50%	7.71773	0.30611	5.51265	0.21865	10.80072	0.42839
60%	8.61243	0.3416	5.8698	0.23282	12.16809	0.48263
70%	9.64821	0.38268	6.2982	0.24981	13.72833	0.54451
80%	10.65109	0.42246	6.86511	0.27229	15.38426	0.61019
90%	11.77863	0.46718	7.34968	0.29151	16.95293	0.67241

The molar refraction of solvent ethanol-water, methanol-water, DMSO-water were calculated from-

$$Rs - W = x_1 R_1 + x_2 R_2$$

Where: R_1, R_2 are the molar refractions of solvent and water respectively.

The molar refraction of solutes of drugs in binary liquid mixture here determined from, R_{mix} =

$$\frac{n^2 - 1}{(n^2 + 2)\left(\frac{x_1 M_1 + x_2 M_2 + x_3 M_3}{d}\right)}$$

Where, n = refractive index of solution.
x_1 = mole fraction of solvent (Ethanol, methanol, and DMSO).

x_2 = mole fraction of water
x_3 = mole fraction of solute
M_1, M_2, M_3 = molecular weight of solvent, water and solute respectively
d = density of solution.

$$R_{comp.} = R_{solution} - R_{s\text{-}w}$$

The polarizability constant (α) of compound is determined from.

$$R_{Liq} = \frac{4}{3} \pi N_A \alpha$$

Where, N_A = Avogadro s number.

RESULTS AND DISCUSSION

Refractive index is an important physical parameter of liquids. The potential of refractometry depends on sensitivity and time of measuring.

In percent investigation, molar refraction and polarisability constant of hetrocyclic antiemetic and anti inflammatory drugs is ethanol-water, methanol water and DMSO – water were determined with respect to variation in percentage of binary solvent mixture

Binary for all the selected compounds with increase in percentage of solvent molar refraction as well as polarisability constant increases.

In the present study with respect to variation in percentage of binary solvent mixture, molar refraction and polarisability constants values are highest in DMSO – water mixture the reported trend may be given as-

DMSO – water > ethanol- water > methanol – water.

CONCLUSION

Polarisability depends on electron density, atomic radii, solute – solute interaction, solute – solvent interaction as well as molecular interactions. The molar polarization and polarisability constant depends on the polarization interaction energy and energy of distortion polarization. The varying trends in polarisability constant and molar refraction may be attributed due to variation is polarization interaction energy.

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