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Abstract:-

Refractive index, molar polarizability constants and molar refractivities of Loperamide and Lorazepam have been studied in DMF and Dioxane at 29oC (±0.1oC) temperature and at different concentrations (0.63 x 10-3 to 10.0 x 10-3 M). The values of molar refractivity (R) and molar polarizability (α) are found to be decreased with decrease the concentration of solute.

EFFICACY OF ADVANCE ORGANIZER MODEL FOR TEACHING ZOOLOGY UNITS AT SECONDARY SCHOOL LEVEL–A STUDY.

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Refraction, polarizability , Abb ´s refractometer.

INTRODUCTION

Refractive index is one of the important additive properties of liquid when a ray of light passes from one medium to another, it suffers refraction that is a change of direction. If it is passed from less dense to more dense medium, it is refracted towards the normal to form angle of refraction (r) which is less than angle of 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 light such as refractive index, viscosity and ultrasonic velocity of binary mixtures are studied by many workers[1-3]. Oswal et al4 have studied dielectric constants and refractive index of binary mixtures.

The study of refractive index in mixed solvents of Schiff basses has been done by Burghate et al[5].Gulwade et al6 have studied acoustical properties of substituted azoles in N-N dimethyl formamide (DMF) at different temperature.

Sangita Sharma et al[7] estimated the refractive index and density of mixing properties of binary liquid mixtures of Eucalyptol with hydrocarbon at various temperatures. Gadpayle[8] and Tambatkar[9] have also study refractive index of some chalcones as well as heterocyclic and non heterocyclic drugs in different solvents.

However study of molar refractivity and molar polarizability constants of novel compounds Loperamide and Lorazepam in non aqueous solvents such as DMF and Dioxane under identical sets of experimental conditions which could cover minifold aspect of solute-solvent interaction is scanty. Therefore the present study is undertaken to make the systematic study of above novel compounds refractometrically at 29°C (±0.1°C) temperature.

EXPERIMENTAL.

Above novel compounds are extensively used as a drugs in pharmaceutical. These compounds provide the photographic material with good storage stability even at high temperature and high humidity.

The compounds are synthesized in the laboratory by standard method and purity is checked by M.P., TLC, NMR etc. The solutions of the compounds re prepared in different solvents (DMF and Dioxane) by dissolving an appropriate amount by weight All the weighings 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 solvent and solutions are measured at different concentrations (0.63×10^{-3} to 10.0×10^{-3} M) by Abbe´s refractometer having accuracy ±0.01unit.

The temperature of the prism box is maintained constant by circulating water from thermostat at 29°C (±0.1°C). Refractometer is initially calibrated with glass piece (n=.5220) provided with the instrument.

The molar refraction of solvent and solution mixture are determined from

$$Rm = [(n^2+1)/(n^2-1)](M/d) \quad \text{----------(1)}$$

$$Rm = 4\pi No\,\alpha \quad \text{----------(2)}$$

$$Rm(solution) = X_1 Rm_1 + X_2 Rm_2 \quad \text{----------(3)}$$

Where

Rm → molar refraction, n → refractive index, d → density of solution, No → Avogadro's number, α → polarisability constant, Rm_1 & Rm_2 → molar refractivity of solvent and solute and X_1 & X_2 → mole fraction of solvent and solute in solution.

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

$$Rm(solute) = R(mixture) - R(solven). \quad \text{----------(4)}$$

The refractive index of solvents and solutions at different concentrations are measured from Abbe´s refractometer and the values of molar refractions and polarisability constants are evaluated and presented in Table 1 to 4 for different systems.

Table-1

Molar refraction and polarizability constant for Loperamide in DMF

Sr. No.	Molarity (M)	R.I.	Rm ($cm^3\ mole^{-1}$)	A x 10^{-23} cm^3
1	0.01	1.432	1.881	0.075
2	0.005	1.419	0.963	0.038
3	0.0025	1.405	0.495	0.020
4	0.00125	1.388	0.256	0.010
5	0.00063	1.374	0.132	0.005

Table-2
Molar refraction and polarizability constant for Loperamide in Dioxane.

Sr. No.	Molarity (M)	R.I.	Rm (cm^3 $mole^{-1}$)	A x 10^{-23} cm^3
1	0.01	1.419	1.468	0.058
2	0.005	1.404	0.756	0.030
3	0.0025	1.390	0.388	0.015
4	0.00125	1.376	0.200	0.008
5	0.00063	1.363	0.103	0.004

Table-3
Molar refraction and polarizability constant for Lorazepam in DMF

Sr. No.	Molarity (M)	R.I.	Rm (cm^3 $mole^{-1}$)	A x 10^{-23} cm^3
1	0.01	1.428	1.186	0.047
2	0.005	1.415	0.608	0.024
3	0.0025	1.402	0.311	0.012
4	0.00125	1.388	0.160	0.006
5	0.00063	1.375	0.082	0.003

Table-4
Molar refraction and polarizability constant for Lorazepam in Dioxane.

Sr. No.	Molarity (M)	R.I.	Rm (cm^3 $mole^{-1}$)	A x 10^{-23} cm^3
1	0.01	1.418	0.918	0.036
2	0.005	1.409	0.473	0.019
3	0.0025	1.389	0.242	0.010
4	0.00125	1.374	0.125	0.005
5	0.00063	1.360	0.065	0.003

RESULT AND DISCUSSION.

It could be seen from above Table 1 to 4 that molar refractivity and polarisability constants decrease with decreasing concentration of solution.

It is also observed that values of Rm and a are found to be smaller due to non polar solvents DMF and Dioxane due to non involvement in H-bonding and does not associate with solute.

This may also be attributed to the fact that the dipole in the compound lies perpendicular to the longer axis of the molecular 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 concentrations because of mutual compensation of the dipoles.

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