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NOTE

Viscosity and Polarizability Measurements of 3-Acetyl-6-methyl-(2*H*)-pyran-2,4-(3*H*)-dione Derivative in Different Phase Systems

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Propan-2-ol-water composition mixtures were used to determine viscosity, refractive index of 3-acelyl-6-methyl-(2*H*)-pyran-2,4-(3*H*)-dione derivative. The values were used to calculate relative viscosity, molar refraction, polarizability constant, nature of dipole and solute-solvent interactions.

Key Words: Relative viscosity, Molar refraction, Polarizability constant, Solute-solvent interaction.

Various researcher's are interested to find out binary liquid mixture interactions along with solute[1,2]. Viscosity, molar refraction and polarizability constants of electrolyte and non-electrolytic solvents with solute gives various new physical parameters of solvent mixtures[3,4]. It is observed that the percentage of solvent mixture and nature of solute affects viscosity, molar refraction and polarizability constants.

1-(Phenylanil)-2-methyl-2-(2,4-dione-6-methyl-3-pyran)imine is prepared by refluxing equimolar quantities of 3-acetyl-6-methyl-(2*H*)-pyran-2,4-(3*H*)-dione and aniline. The purity of compound is confirmed by physical, chemical and spectral studies[5].

Different solvent mixtures (60,70 and 80 %) of 2-proponal-water were prepared. The solvent mixtures were used to prepare 1×10^{-6}, 2×10^{-6}, 3×10^{-6}, 4×10^{-6}, 5×10^{-6} M solutions at 27 ± 0.1 ºC. Densities of mixture solutions were determined by pycknometer (± 0.2 %). Ostwald viscometer (± 0.2 %) is used to determine viscosities. Abbe's refractometer (± 0.001 unit) is used to determine refractive index of mixture solutions at 27 ± 0.1 ºC.

The empirical formula $n_r = d_s \times t_s / d_b \times t_b$ is used to find out relative viscosity[6]. Molar refraction and polorizability constant of mixture solutions were calculated[7] by using formulae. $R_{solute} = R_{mixture} - R_{s\text{-}w}$ and polarizability constant (α), $R_{solute} = (4/3)\pi N_o \alpha$.

The values of relative viscosities are used to determine solute-solvent and solvent-solvent interactions. The values of molar refraction and polarizability constant are used to find out dipole nature of solute-solvent and solvent-solvent system. The observed values of relative viscosity, molar refraction and polarizability constants are given in Tables 1-3.

TABLE-1
RELATIVE VISCOSITY OF 1-(PHENYLANIL)-2-METHYL-2-(2,4-DIONE-6-METHYL-3-PYRAN)IMINE IN PROPAN-2-OL-WATER MIXTURE

Concentration (M)	Relative viscosity (cp)		
	60 %	70 %	80 %
1×10^{-6}	1.0787	1.0562	1.0357
2×10^{-6}	1.0890	1.0699	1.0432
3×10^{-6}	1.0991	1.0836	1.0688
4×10^{-6}	1.1220	1.1021	1.0790
5×10^{-6}	1.1521	1.1230	1.0994

TABLE-2
MOLAR REFRACTION 1-(PHENYLANIL)-2-METHYL-2-(2,4-DIONE-6-METHYL-3-PYRAN)IMINE IN PROPAN-2-OL-WATER MIXTURE

Concentration (M)	Molar refraction (cm^3 mol^{-1})		
	60 %	70 %	80 %
1×10^{-6}	0.2846	0.1376	0.1035
2×10^{-6}	0.2953	0.1537	0.1048
3×10^{-6}	0.3031	0.1703	0.1221
4×10^{-6}	0.3142	0.1861	0.1448
5×10^{-6}	0.3163	0.2181	0.1742

TABLE-3
POLARIZABILITY CONSTANT OF 1-(PHENYLANIL)-2-METHYL-2-(2,4-DIONE-6-METHYL-3-PYRAN)IMINE IN PROPAN-2-OL-WATER MIXTURE

Concentration (M)	Polarizability constant (10^{-24} cm^3)		
	60 %	70 %	80 %
1×10^{-6}	0.1128	0.0545	0.0410
2×10^{-6}	0.1170	0.0609	0.0415
3×10^{-6}	0.1201	0.0675	0.0484
4×10^{-6}	0.1245	0.0738	0.0574
5×10^{-6}	0.1253	0.0864	0.0690

Relative viscosity: The increase in percentage of propan-2-ol in solvent mixture decreases the values of relative viscosity. It is observed that in different concentrations of 1-(phenylanil)-2-methyl-2-(2,4-dione-6-methyl-3-pyran)imine, there is increase in relative viscosity as there is increase in concentration of solute.

There is increase in percentage of propan-2-ol in different solvent mixtures (60, 70 and 80 %) the tendency of forming H-bonding is less with solute and solvent 2-propanol in comparision with solute-water, as water is more polar and having more tendency to form H-bonding. Decrease in percentage of water may caused the decrease in the values of relative viscosity.

Increase in values of relative viscosity, results an increase in concentration of solute may be due to more availability of solute particles for forming H-bonding with solvent mixture.

Molar refraction: Molar refraction of 1-(phenylanil)-2-methyl-2-(2,4-dione-6-methyl-3-pyran)imine in 2-propanol-water mixture solvents indicates that there is decrease in values of molar refraction in 60, 70 and 80 % 2-propanol-water mixture solvent, which may be due to an increase in percentage of less dielectric constant solvent. 2-Propanol have less dipole and less interaction with solute causes decrease in value of molar refraction.

Increase in the values of molar refraction is also observed as there is an increase in concentration of solute. Decrease in concentration of more dielectric solvent affects the values of molar refraction. More interaction is expected between solute and more dielectric solvent. The concentration of solute in different binary mixture affects the molar refraction. Increase in concentration of solute, there is increase in molar refraction, it may due to increase in molar dissociation with binary solvent mixture.

Polarizability constant: It is observed that, there is decrease in polarizability is decreases as there is a decrease in more polar solvent, since, polar solvent have more tendency to form enolic form of solute.

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