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INVESTIGATION OF STABILITY CONSTANT OF COMPLEX OF A NEW SYNTHESIZED SCHIFF BASE LIGANDS OF [5-HYDROXY 3-METHY 1-(2,4-DINITROPHENYL) PYRAZOL 4-YL] (PHENYL) METHANONE AND 4-AMINO ANTIPYRINE SPECTROPHOTOMETRICALLY

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ABSTRACT:

Using the Job's method of continuous variation the stability constant of complex of a new synthesized Schiff base ligand is investigated in 70% dioxane-water mixture maintaining ionic strength constant (0.1 M). The Schiff base was synthesized from [5-hydroxy 3-methy 1-(2,4-dinitrophenyl) pyrazol 4-yl] (phenyl) methanone and 4-Amino Antipyrine. The Formation 1:1 and 1:2 complex is confirmed using isobestic point method spectrophotometrically. Further Comparison of present method and pH-metric method are carried. The results obtained of stability constant are in good agreement.

Keywords: 5-hydroxy 3-methy 1-(2,4-dinitrophenyl) pyrazol 4-yl] (phenyl) methanone, Spectrophotometry, Formation constant, Schiff base.

INTRODUCTION

Interferometry technique is one of the most significant technique to understand the solute-solvent, ion-solvent interaction property of compound in aqueous and non-aqueous medium[1-4]. Meshram et. al. investigate for some substituted Pyrazolines different acoustical properties in binary mixture acetone-water and observed variation of ultrasonic velocity with concentration[5]. Palani have examined the measurement of ultrasonic velocity and density of amino acid in aqueous magnesium acetate at constant temp[6]. By considering size of ion and polarity of solvent ion-ion interaction can be determine and the strength of this interaction is directly proportional to the size of the ions and magnitude of dipole but inversely proportional to the distance between ion and molecules. Voleisines et al. has been studied the structural properties of solution of lanthanide salt by measuring ultrasonic velocity[7]. Tadkalkar et.al. have studied the acoustical properties and thermodynamic properties of citric acid in water at different temperature[8].

After review of literature we observed that there is no study under identical set of experimental condition for Schiff base of Pyrazolone with 4-amino antipyrine. It attract our interest toward the Schiff base of (5-hydroxy -3-methyl-1-(2,4dinitrophenyl)-pyrazol-4-yl)(phenyl)methanone and 4-amino antipyrine acoustical properties study under suitable condition.

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EXPERIMENTAL

The Schiff base of (5-hydroxy-3-methyl-1-(2,4dinitrophenyl)-pyrazol-4yl)(phenyl) methanone and 4-amino antipyrine is synthesized by known Technique according to literature process and it will be purified by Vogel's standard method[9]. This novel synthesized Schiff base is used for present study. Solution Schiff Base is prepared in the double distilled Dioxane solvent. The solution of different concentration of Schiff base is prepared. The specific gravity bottle use to determine the densities by relative measurement method with accuracy ± $1x10^{-5}$ gm/cm^3. The ultrasonic velocities were measured by using ultrasonic interferometer having frequency 3MHz. By circulating water through the double wall measuring cell, made up of steel constant temperature was maintained.

In the present analysis, different acoustic properties such as intermolecular free length (Lf), adiabatic compressibility (bs), apparent molal volume (fv), apparent molal compressibility (fk),relative association (RA), specific acoustic impedance (Z), limiting apparent molal compressibility (f^0k), limiting apparent molal volume(f^0v), solvation number(Sn) and their constant (Sk, Sv) have been evaluated

RESULTS AND DISCUSSION

In the present study, the acoustical properties are recorded (table-1, table-2 and table-3). From the data obtained we can say that as system concentration increase Intermolecular free length(Lf) decrease and it is observe that ultrasonic velocity are increases. The value of specific acoustic impedance property (Z) increased when there is increase in concentration of Schiff base in dioxane-water system. The value of adiabatic compressibility is decreases with increase in solution concentration it show that there is solute-solvent interaction present. This indicates that there is strong interaction between solvent and solute molecule in solution. The strong interaction between solvent and solute molecule was observed due to increase in the apparent molal volume also increases. It was initiated that decrease in the value of apparent molal compressibility with the increase in concentration of Schiff base; it indicate that weak electrostatic attraction force among the close vicinities of ions.

When the concentration of solution increases there was a decrease in solvation number are detected; it specifies that there are strong coordination bond forms through solvent molecule in primary layer. The value of Sk exhibits negative it indicates the presence of weak ion-ion interactions in Schiff base of benzoyl Pyrazolone system. From table-3, It was detected that the sign of limiting apparent molal volume is positive it indicates that the ion-dipolar interaction between solvent and Schiff base derivative of benzoyl Pyrazolone. Altogether the sign of Sv are positive, directed toward the strong interaction between dioxane and solute molecule. The value of Sk, Sv has been govern from fig. 1 and 2.

Table-1 Ultrasonic velocity, density, adiabatic compressibility (β_S), Specific acoustic impedance (Z) Intermolecular free length (L_f).

Concentration moles lit^{-1} (m)	Density (ds)	Ultrasonic velocity	Adiabatic compressibiliy	Intermolecular free length	Specific acoustic

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	kg m^{-3}	(Us) m s^{-1}	(β_S) $x10^{-10}$ m^2N^{-1}	(L_f) $x10^{-11}$ m	impedance ($Zx10^6$) kg m^{-2} s^{-1}
Schiff base of benzoyl pyrazolone + 10% 1,4 Dioxane					
$1x10^{-3}$	1019.85	1491	4.41071	4.2239	1.5206
$2x10^{-3}$	1019.94	1493	4.39851	4.2180	1.5228
$3x10^{-3}$	1020.02	1496	4.38054	4.2094	1.5259
$4x10^{-3}$	1020.09	1499	4.3616	4.2003	1.5293
$5x10^{-3}$	1020.15	1508	4.31256	4.1766	1.5380
$6x10^{-3}$	1020.2	1513	4.28441	4.1630	1.5431
$7x10^{-3}$	1020.24	1517	4.25658	4.1494	1.5482
$8x10^{-3}$	1020.28	1522	4.23235	4.1376	1.5526
$9x10^{-3}$	1020.32	1525	4.21164	4.1275	1.5565

Table-2 Concentration (m), Relative association (R_A), Apparent molal compressibility (ϕ_κ), Apparent molal volume (ϕ_v) , Solvation number (S_n)-

Concentration (m) moles lit^{-1}	Apparent molal volume (ϕ_v) m^3mole^{-1}	Apparent molar compressibility (ϕ_k) $x10^{-10}$ m^2 N^{-1}	Relative association (R_A)	Solvation number (S_n)
$1x10^{-3}$	0.44660	2.394	0.99935	0.99496
$2x10^{-3}$	0.45137	2.387	0.99831	0.99211
$3x10^{-3}$	0.45614	2.377	0.99739	0.98797
$4x10^{-3}$	0.46091	2.367	0.99639	0.98361
$5x10^{-3}$	0.46569	2.34	0.99365	0.97246
$6x10^{-3}$	0.47047	2.324	0.99209	0.96604
$7x10^{-3}$	0.47526	2.309	0.99052	0.95971
$8x10^{-3}$	0.47885	2.296	0.98916	0.95419
$9x10^{-3}$	0.48163	2.284	0.98799	0.94947

Table-3 Limiting Apparent molal compressibility (ϕ^0_κ), Limiting Apparent molal volume (ϕ^0_v), S_v and S_k

Ligand	Limiting Apparent molal volume (ϕ^0_v) m^3mole^{-1}	Limiting Apparent molal compressibility (ϕ^0_κ)$x10^{-10}$ m^2 N^{-1}	S_v $m^3kg^{1/2}mole^{-3/2}$	S_k $m^3mole^{-2}kg.N^{-1}$
Schiff base of pyrazolone	0.4027	2.4162	4.5066	-14.867

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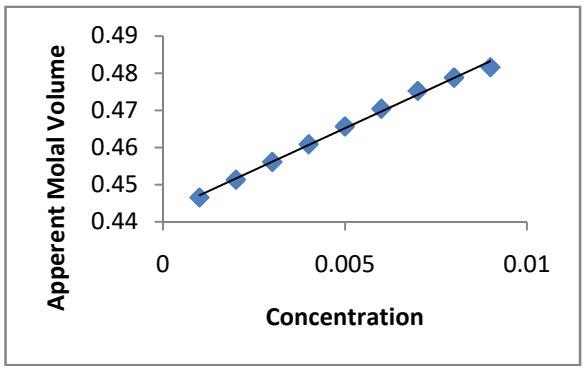

Fig.-1 -Apparent molal volume (m^3mole^{-1})

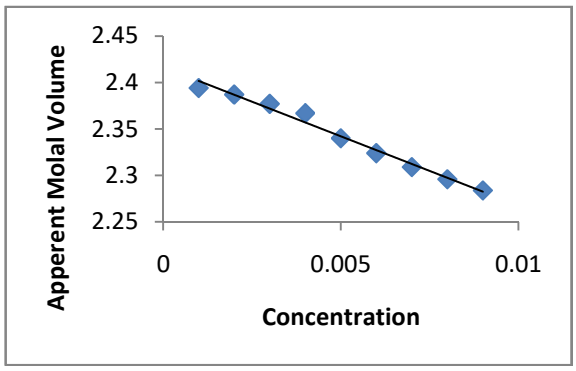

Fig.-2- Aparent molar compressibility10^{-9} ($m^2 N^{-1}$) Vs Concentration (mole lit^{-1})

Vs Concentration (mole lit^{-1})

CONCLUSION

In present study the acoustical properties were intended from experimental data, it shows that there are interface between ion-ion and solvent-solute exists between Schiff base of (5-hydroxy -3-methyl-1-(2, 4dinitrophenyl)-pyrazol-4-yl)(phenyl) methanone and 4-amino antipyrine in 1,4 dioxane-water solvent. And from the investigational statistics it is resolved that there are interaction among the solute and solvent molecule in Schiff base of benzoyl Pyrazolone & dioxane-water systems are strong.

REFERENCES

[1] A.V. Kachare , D.D.Patil, S.R.Patil, and A.N.Sonar, Journal of Applicable Chemistry, **2013**, 2 (5):1207-1215
[2] M. K. Rawat and Sangeeta, Ind. J. pure Appl. Phy. , **2008**, 46: 187-192.
[3] D. Ubagaramary, Dr.P.Neeraja, Journal of Applied Chemistry, **2012**, Volume 2, Issue 5 , PP 01-19
[4] H. Ogawa and S J Murakami, J. Solution. Chem., **1987**, 16:315.
[5] G. R. Bedare, V. D. Bhandakkar ,B. M. Suryavanshi, Science park, **2013**, Volume-1, Issue-4, 15:1-32.
[6] F. Kawaizumi, K. Matsumoto and H. Nomura, J. Phys. Chem., **1983**,87(16): 3161-3166.
[7] D. V. Jahagirdar , B. R. Arbad , S. R. Mirgane, M. K. Lande and A. G. Shankarvar , J.Molecular Liq. **, 1998**,75: 33-43.
[8] R. Palani and S. Saravanan, Research J. Phy., **2008**, 2(1):13-21.
[9] B. Voleisiene and A. Voleisis , J. Ultrasound **, 2008**,63(4) : 7-18.
[10] V. K. Syal, A.Chauhan and S. Chauhan, J. Pure Ultrasound. **, 2005,** 27: 61-69.
[11] A. Tadkalkar, P.Pawar and G.K. Bichile, J.Chem. Pharm.Res., **2011,**Vol.3(3) :165.
[12] A.P. Mishra and D.K. Mishra, J.Chem. Pharm.Res. **2011,** Vol.3 (3):489.
[13] M. Arvinthraj , S. Venktesan and D. Meera, J.Chem. Pharm.Res, **2011,** Vol.3 (2):623.

[14] S.K. Thakur and S.Chauhan, J.Chem. Pharm.Res., **2011,**Vol.3(2) :657.
[15] Shilpa A. Mirikar, Pravina P. Pawar, Govind K. Bichile, American Journal of Pharmacology and Pharmacotherapeutics,**2015**, Vol.2(1):2-7.
[16] M. P Wadekar., A. S Shrirao. and R. R., Tayade J. Chem. Bio. Phy. Sci., Section A, **2015**, 5(1): 81-90.