EFFECT OF DIFFERENT TEMPERETURES AND SUBSTITUTION ON SUBSTITUTED THIOCARBAMIDONAPHTHOL IN 90% ETHANOL WATER MIXTURE CONDUCTOMETRICALLY

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ABSTRACT

Temperature and substitution closely concern to conductometric properties and thermodynamic parameter of electrolytic solution. Present research scheme deal with conductometrically studies effect of different temperatures and substitutions on substituted thio-carbamidonaphthtoli.e.,5-phenylthiocarb amido-1-naphthol (L_2), 5-p-chlorophenylthiocarbamido-1-naphthol (L_3)at 0.01M, 0.005M, 0.0025M and 0.0012M concentrations in 90% ethanol-water mixture and298 K and 308 K temperatures. During this investigation G, k, μ values as well as thermodynamic parameters such as ∆G, ∆H and ∆S were determined. This work helps to understand effect of substitutions, temperature variation and different concentrations. In this investigation it is found thatmolar conductance values of L2 are greater than L3 in 208K as well as 308 K respectively, but it shows more values at 308K. This investigation reveals that L2 will show good pharmacodynamic and pharmacokinetic effect than L3.

Keywords: *5-phenylthiocarbamidonaphthol (L2), 5-p-chlorophenylthiocarbamidonaphthol(L3), conductometric properties, thermodynamic parameter.*

Introduction

Pharmacodynamic and pharmacokinetic study of drug molecules has significant role in pharmaceutical and medicinal sciences. Drug ionization and diffusion crucially interfere in this study. These terms are closely concern to solubility of drugs. Now days it becomes challenging task for researcher to developed and enhance solubility of drug. Solubility of drug can be determined from conductivity data. Accordingly, conductometric investigation becomes more significant. Conduction of solution depend on number on ions and ion formation depend on ioninsation and solubility of solute and their interaction with solvent during salvation Conductometric investigation plays effective role to understand these all. Now a day many researchers had remarkably attracted toward conductometric measurement due to its significances. Conductometric properties and thermodynamic parameters are so crucial in the physic-chemical study of newly synthesis molecules. Solubility, association, dissociation investigation of these molecules becomes crucial because these properties and parameters are closely concern with conductivity of electrolytic solution.

conductometric properties, thermodynamic behavior and Walden product of 3-(2-hydroxy-3-nitro-5-methyl) phenyl-6-amino-1,2,5-thioxazine in 50% ethanol-water mixture at different temperatures keeping the concentration constant (01M) investigated by Waghmare *et al*[1]. Assessment of thermodynamic parameters of substituted thiocarbamidonaphthol was studied by Padhen*et al*[2]. Mohammed Al Bratty *et al*[3] carried outconductometric determination of the antihistaminic diphenhydramine hydrochloride using silver nitrate as a titrant. Elwy *et al*[4] was investigated dropropizine and tizanidine hydrochloride in their pharmaceutical formulation by conductometric analysis. Certain pharmacological drugs studies using silver and bismuth conductometrically investigated by Mervat Mohamed Hosny Ali Abdelmoniem[5]. Marwa *et al*[6] was carried out conductometric and spectroscopic determination of mebeverine hydrochloride and the solubility products of its ion recognition thermodynamic characterization of dexamethasone sodium phosphate and its com-plex with DNA as studied by Shah *et al*[7] with the help of conductometric and spectroscopic techniques complex formation between Cu(II) Ion and 4-Amino-3-Ethyl-1,2,4-Triazol-5-Thione In Binary Ethanol + Water mixtures was conducto -metrically investigated by Hakimi *et al*[8]. Some conductometric titration methods have been reported for determination

of some drugs[9-13].

Present work designed to conductometrically studies effect of different temperatures and substitutions on substituted thiocarbamidonaphthtoli.e. 5-phenylthiocarb amido-1-naphthol (L_2), 5-p-chlorophenylthiocarbamido-1-naphthol (L_3) at 0.01M, 0.005M, 0.0025M and 0.0012M concentrations in 90% ethanol-water mixture and 298 K and 308 K temperatures.

Materials and Methods

Experimental

Standard method used for purification of chemical and solvent. All fresh solutions prepared through experiment by using analytical grade chemical. First upon were prepared 0.1 M solutions of L2 and L3 90% ethanol-water mixture respectively then prepared 0.01M, 0.005M,0.0025M and 0.0012M solutions of L2 and L3 by using 90% ethanol-water mixture through serial dilution. During experiment thermal equilibrium was maintain with the help of thermostat and after attaining thermal equilibrium by solutions carried out their conductometric analysis.

Result and Discussion

Conductivity bridge use to determine conductance for each concentration solutions of L2 and L3 in 90% ethanol-water mixture at 298K and 308 K. In present work specific conductance (k) and molar conductance (μ) was determined form observe conductance (G) values. These conductometric properties of L2 and L3 were used to determined thermodynamic parameters for same solutions.

Observed conductance (G), specific conductance (k) and molar conductance (μ) were determined by known literature method and calculated data tabulated in following Table-1

TABLE –1 CONDUCTOMETRICMEASUREMENTS i.e., G, k and μ AT DIFFERENT CONCENTRATIONS AND % COMPOSITIONS

Ligand	Temperature	Conc. (M)	Observed conductance (G)	Specific conductance (k) 10^{-6}	Molar conductance (μ)
L3 in 90% E-W mixture	298 K	0.01	0.01764	2.05802	0.20580
		0.005	0.01218	1.46637	0.29327
		0.0025	0.01114	1.41857	0.56742
		0.0012	0.01133	1.44922	1.20768
	308 K	0.01	0.0212	2.50741	0.250741
		0.005	0.0144	1.77256	0.354511
		0.0025	0.01318	1.69167	0.676667
		0.0012	0.01231	1.54916	1.290964
L2 in 90% E-W mixture	298 K	0.01	0.03256	3.79867	0.379867
		0.005	0.01692	2.03703	0.407406
		0.0025	0.01098	1.39819	0.559277
		0.0012	0.00833	1.06549	0.887908
	308 K	0.01	0.03519	4.16207	0.416207
		0.005	0.01886	2.32156	0.464311
		0.0025	0.01239	1.59027	0.636108
		0.0012	0.01015	1.27733	1.064442

Table-1 revel that the observed conductance (G), specific conductance (k) and molar conductance (μ) for L2 greater than L3 at 298 K as well as 308 Kin 90% ethanol-water mixture. Observed conductance and specific conductance decreases along with decrease concentrations form 0.01M to 0.012 M for L2 at both temperatures while molar conductance increases respectively. Molar conductance values greater for L2 rather than L3 also simultaneously they were found greater at 308 K than 208K.

Calculated values the specific constant (Ksp), log (Ksp) and thermodynamic parameters viz. (ΔG), (ΔS) and (ΔH) of L3 and L2 tabulated in Table 2

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TABLE – 2 -THERMODYNAMIC PAPAMETERS DETERMINATION OF Ksp, LogKsp, ΔG,ΔH AND ΔS AT DIFFERENT CONCENTRATIONS AND % COMPOSITIONS AT 303 K							
SYSTEM: LIGAND					**Temperature: - 303 K**		
		Conc. [M]	**Ksp**	**Log Ksp**	**ΔG**	**ΔH**	**ΔS**
L3 in 90% **E-W mixture**	298K	0.01	763.0802	2.88257	-16447.5	-52860.9	122.1926
		0.005	751.5247	2.875943	-16409.7	-51882.3	119.0355
		0.0025	401.5148	2.603702	-14856.3	-46970.5	107.7657
		0.0012	184.6606	2.266374	-12931.6	-40883.7	93.79908
	308K	0.01	658.0637	2.818268	-16620.2	-54285.5	122.2899
		0.005	658.3989	2.818489	-16621.5	-54287.3	122.2916
		0.0025	361.4339	2.558029	-15085.5	-49271.2	110.9924
		0.0012	206.8757	2.315709	-13656.5	-44604.9	100.4819
L2 in 90% **E-W mixture**	298K	0.01	407.9967	2.610657	-15395.9	-50290.9	113.2955
		0.005	381.0976	2.581036	-15221.2	-49714.4	111.9909
		0.0025	339.7893	2.53121	-14927.4	-48753.8	109.8261
		0.0012	320.2049	2.505428	-14775.3	-48258.8	108.7128
	308K	0.01	399.0423	2.601019	-14841	-46923.3	107.6587
		0.005	375.9398	2.575118	-14693.2	-46451.6	106.5718
		0.0025	329.8153	2.518271	-14368.9	-45424.5	104.2135
		0.0012	216.263	2.334982	-13323.1	-42117	96.62395

Table-2 revel that the values of Ksp, log Ksp, and ΔS decreases along with decreases concentrations from 0.01 to 0.0012M while ΔG and ΔH values increases for L3 and L2 respectively. The values of Ksp, log Ksp, ΔH and ΔS decreases when temperature increase from 208K to308 K in 90% ethanol-water mixture while ΔG values increases. The values of Ksp, log Ksp and ΔS greater for L3 than L2 and ΔG and ΔH values for L2 greater than L3. Phenyl is electron withdrawing group substituted with terminal nitrogen this is bulkier and electron withdrawing group in L2 while in L3 this terminal nitrogen is substituted by chloro-phenyl ring. Cholro group substituted at para position of substituted phenyl ring. This chlorine atom created –I and +R effect. Carbanion of L2 has more stable than L3. This investigation showed that conductance, specific conductance, molar conductance, Ksp, ΔH, ΔS and ΔG values of these drugs are influence by different functional group such as electronic realizing, electron withdrawing. These thermodynamic parameters are directly affected by constituent as well as nature of drug.

Conclusion

L2 shows good ionization and conductance rather than L3 because Phenyl group substitution support for more ionization of L2 rather than L3. Thus,Conduction properties and thermodynamic parameters for L2 and L3 variedalong with increasing temperature from 208K to 308K as well as along increasing molar concentrations. Ionization, substitution of molecules and various molecular interactions between solute and solvent in solution influence thermodynamic parameters. Molar conductance values of L2 are greater than L3 in 208K as well as 308 K respectively, but it shows more values at 308K. This investigation reveals that L2 will show good pharmacodynamic and pharmacokinetic effect than L3.

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