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THERMODYNAMIC STUDY OF SUBSTITUTED THIOCARBAMIDONAPHTHOL

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Abstract:

Conductivity of drug plays a vital role to explain pharmacodynamics of drug. Mobility of ions decided transmission of ions. Recent work deals with thermodynamic parameters (viz. ΔH; ΔS and ΔG) study of 5-phenylthiocarbamido-1-naphthol by conductometric measurement at different concentrations and constant temperature (303K) in 70% ethanol-water mixture. These study also contribute to solvent-solvent, solute-solvent and solute-solute interactions and the effects of various substituent.

Key Wards: ***5-phenylthiocarbamido-1-naphthol, thermodynamic parameters.***

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INTRODUCTION:

Solubility and permeability of drugs efficiently influence by mobility of ions in electrolytic solution, these two are prime biopharmaceutical parameters which are accountable for effective bioavailability and good in vitro and vivo correlation [1]. Nowadays pharmaceutical technologist has a great challenge to raise the solubility and dissolution rate and oral bioavailability of weakly water soluble drugs [2]. Hydrotropic Salisation is considered as one of the sophisticated methods of solubalisation [3]. Enhance the aqueous solubalisation of insoluble drugs by adding hydrotropic agents. Number of researchers work on the effect of solubility enhancers [4,5]. The Valuable information about solute-solute and solute-solvent interaction obtains from the coductometric measurements [6]. Gomaa and Al-Jahdalli [7] was investigated ionic association of divalent asymmetric electrolyte Cu $(NO_3)_2$ with Kryptofix-22 in mixed (MeOH-DMF) solvents at different temperatures by conductometric measurements. A Conductometric measurement of the alkali metal at different proportion of mixed solvents was carried out by Izonfuo and Obunwo[8] and Roy et al [9]. Very few researchers investigated the thermodynamic parameter and Walden product of different complexes and they also examine the comparison of transition metal complexes among the halide group [10-14]. The ion pair formation and thermodynamic parameters of Glycine Bis-1-amidino-O-methylurea cobalt (III) halides in water-methanol mixture at different temperatures was investigated by Singh et al [15]. Recent work deals with thermodynamic parameters (viz. ΔH; ΔS and ΔG) study of 5-phenylthiocarbamido-1-naphthol by conductometric measurement at different concentrations and constant temperature in 70% ethanol-water mixture. These studies also contribute to solvent-solvent, solute-solvent and solute-solute interactions and the effects of various substituents.

MATERIALS AND METHODS

Experimental:

All AR grade chemicals used during present investigation. Freshly prepared solution used for analysis. The solvents were purified by standard method. Prepared 0.01M, 0.005M, 0.0025M and 0.0012M concentrations of 5-phenyl thiocarbamido-1-naphthtol 70% ethanol-water mixture. Maintain the thermal equilibrium (303 K) of drugs solution by using thermostat. After getting thermal equilibrium, conductivity of that electrolyte solution was measured.

RESULT AND DISCUSSION:

Firstly prepared solution of 0.01 M concentration then by serial dilution method prepared solutions of 0.005M, 0.0025M and 0.0012M with 70% ethanol-water mixture Measured conductance of each solution by using Conductivity Bridge at 303 K. The results obtained are given in Table-1 to Table-2. From the data observed conductance (G), specific conductance (k) and molar conductance (μ) were determined by known literature method.

TABLE – 1 - CONDUCTOMETRIC MEASUREMENTS AT DIFFERENT CONCENTRATIONS OF 5-PHENYLTHIOCARBAMIDO-1-NAPHTHOL

DETERMINATION OF G, k and μ AT DIFFERENT CONCENTRATIONS AND TEMPERATURE 30^0C

% of solution (Ethanol-water)	Concentration C (M)	Observed conductance (G)	Specific conductance (k)	Molar conductance (μ)
70%	0.01 M	0.02589	0.02355	2.355
	0.005 M	0.01528	0.01388	2.776
	0.0025 M	0.01042	0.00938	3.752
	0.0012 M	0.00857	0.00769	6.408

Table 1 revel that the observed conductance (G), specific conductance (k) decreases and molar conductance (μ) increases along with decreasing concentrations. The specific conductance increases with increasing temperature. Calculated values the specific constant (Ksp), log (Ksp) and thermodynamic parameters viz. (ΔG), (ΔS) and (ΔH) of 5-phenylthiocarbamido-1-naphthol by known literature methods at different concentration with same temperature(303K). Obtained result computed in ***Table 2****.*

TABLE – 2 - CONDUCTOMETRIC MEASUREMENTS AT DIFFERENT CONCENTRATION OF 5-PHENYLTHIOCARBAMIDO-1-NAPHTHOL						
DETERMINATION OF Ksp, log Ksp, ΔG,ΔH and ΔS AT DIFFERENT TEMPERATURES KEEPING THE SAME CONCENTRATION.						
SYSTEM: LIGAND [PTCN]			MEDIUM - 70% ETHANOL-WATER			
Temp T(°C)	**Conc. M**	**Ksp**	**Log Ksp**	**ΔG**	**ΔH**	**ΔS**
25	0.01	295.3714	2.470368	-14332.1	-46060.7	104.7151
	0.005	391.4162	2.592639	-15041.4	-48341.9	109.9025
	0.0025	401.7436	2.603949	-15107	-48552.4	110.3807
	0.0012	286.4956	2.457118	-15255.2	-49814.7	112.1567

The change in thermodynamic parameters values closely affected by temperature, molar concentrations and percentage compositions. These parameters shackle by another factors viz. the solute (drug)-solvent interactions, solvent-solvent interactions, solvent-solvent-solute interactions and –solute-solute-solvent interactions. Variation in these parameters affected by the internal geometry as well as internal and intra hydrogen bonding

As observed, the μ values increase with decreasing in concentration indicating less solvation or higher mobility of ions. This is due to the fact that increased thermal energy results in greater bond breaking due to dilution. Also negative values of ΔG indicates that reaction is spontaneous. Negative values of enthalpy change (ΔH) suggests exothermic reaction. Favorable at lower temperature and positive value of (ΔS) revels entropically favorable. The change in thermodynamic parameters values closely affected by molar concentrations and percentage compositions. These parameters shackle by another factors viz. solute (drug)-solvent interactions, solvent-solvent interactions, solvent-solvent-solute interactions and –solute-solute-solvent interactions. Variation in these parameters affected by the internal geometry as well as internal and intra hydrogen bonding

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