ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2017; 3(2): 442-444
www.allresearchjournal.com
Received: 17-12-2016
Accepted: 18-01-2017

DT Tayade
Department of Chemistry, Government Vidarbha Institute of Science and Humanities, Amravati, (M.S.) India

SO Mohod
Department of Chemistry, Government Vidarbha Institute of Science and Humanities, Amravati, (M.S.) India

Correspondence
SO Mohod
Department of Chemistry, Government Vidarbha Institute of Science and Humanities, Amravati, (M.S.) India

Conductometric measurements of 2-Phenyl-thiocarbamidophenol in 60% mixed solvent at different temperatures

DT Tayade and SO Mohod

Abstract
The subject of this study concern with the complex formation reaction between 2-phenyl thiocarbamidophenol and different transition metal ions at different concentration of solute in ethanol-water mixture at different temperature by conductometric method. G, k, μ values are determined. The thermodynamic parameters ΔH, ΔG and ΔS for the ion pair formation determine from the value of ion association constant at different temperature. This measurement revealed that solvent-solvent, solute-solvent and solute-solute interaction and the effects of various substitutents.

Keywords: Thermodynamic parameters, ion-association constant, substituted thiocarbamidophenols

1. Introduction

Conduction of electrolytic solution explained by number of ions of electrolyte in solution. A Conductometric measurement of electrolytic solution provided valuable information concerned to solubility and permeability of drugs, which are essential biopharmaceutical parameters. Conductometric method for metal-ligand complex study is well established area of research work for many chemists because of its various advantages such as low cost method, eco-friendly, less time consuming, proper thermodynamic calculation with different parameters and most importantly easy to operate. Gonna and Al-Jahdalli [1] investigated the ionic association of divalent asymmetric electrolyte Cu $(NO_3)_2$ with kryptofix-22 in mixed solvents at different temperatures by conductometric method. The ion-pair formation and thermodynamic parameters of glycine bis-1-amidino-o-methylureacobalt (3) halides in water methanol mixture at different temperatures were studied by Singh *et al* [2]. The conductances of nimesulide in aqueous solutions of hydrotropic agents at different temperature were investigated by Solanki *et al* [3]. The study of ternary complexes using quinolone antibiotics as primary ligand was investigated by Imran *et al* [4]. Stability of 2-(4-amino-1, 5-dimethyl-2-phenyl)-1, 2-dihydro-pyrazole-3-ylide namino) phenol with metal ions was carried out by Gauda *et al* [5]. The investigations of antihistaminic diphenhydramine hydrochlorides using silver nitrate as titrant were carried out by Hashem *et al* [6]. Singh and Sar [7] were carried out the study of micellization behavior of bile salt with disprine. The studies of alkali metal at different proportion of mixed solvents by conductometric method were investigated by many researchers [8-9]. Investigation of thermodynamic parameter and walden product of different complexes and the complexes of transition metal complexes among the halide group were studied by few researchers [10-11]. The study of interaction between methyl violet and sodium dodecyl sulfate done by conductometric method by Edbey *et al* [12].

Recent work concern to study of thermodynamic parameters of 2-phenylthiocarbamidophenol at different concentration and different temperatures (303.15 K, 308.15 K, 313.15 K). Data analyze by using Shedlovsky method. Recently observed value of association constant at various concentration which helps to examine thermodynamic parameters like ΔH, ΔS and ΔG. Resultant values help to study different interaction.

2. Experimental Section

In this research work all solutions are freshly prepared. AR grade chemical are used. The solutions 0.1M, 0.05M,

0.025M and 0.0125M of 2-phenylthiocarbamidophenol were prepared at 60% ethanol-water mixture. Thermostat was used to maintain the thermal equilibrium of drug solution. After thermal equilibrium the conductance of solution was measured

3. General Procedure

The solution of 0.1M was firstly prepared then after by using serial dilution method the solutions of 0.05M, 0.025M and 0.0125M were prepared in 60% ethanol-water mixture. The conductances of solutions were measured by using Conductivity Bridge at 303.15K, 308.15K and 313.15K.

With the known literature method observed conductance (G), specific conductance (k) and molar conductance (μ) were determined. The result obtained was presented in Table-1 and Table-2.

Table 1: Conductometric Measurements at Different Concentrations of L_1 [Ptcp]

Determination of g, k and μ at different concentrations and at 60% ethanol-water mixture				
Temp	**Concentration C (M)**	**Observed conductance (G) mS**	**Specific conductance (k) mS/cm x 10^{-3}**	**Molar conductance (μ) $mScm^2mol^{-1}$**
303.15 K	0.1 M	0.018	0.0021	0.021
	0.05 M	0.016	0.001926	0.038525
	0.025 M	0.016	0.002037	0.081498
	0.0125 M	0.018	0.002302	0.18419
308.15 K	0.1 M	0.019	0.002266	0.022658
	0.05 M	0.017	0.00211	0.042199
	0.025 M	0.014	0.001778	0.071137
	0.0125 M	0.014	0.001774	0.141922
313.15 K	0.1 M	0.029	0.00343	0.034299
	0.05 M	0.026	0.0032	0.064009
	0.025 M	0.028	0.003594	0.143753
	0.0125 M	0.027	0.003398	0.271826

With the known literature method, the specific constant (K_{sp}), log(K_{sp}) and thermodynamic parameters viz. change in free energy(ΔG), change in entropy(ΔS) and change in enthalpy(ΔH) of [PTCP] at various molar concentration at different temperatures which is shown in Table-2.

Table 2: Conductometric Measurements at Different Concentrations of L_1 [Ptcp]

Determination Of Ksp, Log Ksp, ΔG,ΔH And ΔS At Different Concentrations And Temperatures						
System: Ligand-1 [Ptcp]			Medium - 60% Ethanol-Water Mixture			
Temp T (K)	**Conc. C (M)**	**Ksp**	**Log Ksp**	**ΔG $kJmol^{-1}$**	**ΔH $kJmol^{-1}$**	**ΔS $kJmol^{-1}K^{-1}$**
303.15	0.1	0.00066720	-3.17574	18120.31	-57293.28	-253.07
	0.05	0.00056137	-3.25075	18548.27	-58646.61	-259.04
	0.025	0.00062804	-3.20201	18270.20	-57763.65	-255.15
	0.0125	0.00080200	-3.09583	17664.32	-55846.05	-246.68
308.15	0.1	0.00107829	-2.96726	17214.83	-55323.20	-239.40
	0.05	0.00093507	-3.02916	17573.91	-56477.26	-244.39
	0.025	0.00066431	-3.17763	18435.27	-59250.36	-256.39
	0.0125	0.00066103	-3.17978	18447.77	-59289.63	-256.56
313.15	0.1	0.00071805	-3.14384	18540.26	-60563.15	-256.83
	0.05	0.00062518	-3.20400	18895.00	-61713.81	-261.72
	0.025	0.00078831	-3.10330	18301.18	-59772.86	-253.49
	0.0125	0.00070466	-3.15202	18588.46	-60712.91	-257.47

4. Conclusion

Table No 1. Indicates that observed conductance (G), specific conductance (k) decreases as temperature increases and molar conductance (μ) increases along with increasing temperature.

Table No 2. Reveals that the values of specific constant (K_{sp}), log(K_{sp}) and thermodynamic parameters viz. change in enthalpy(ΔH), change in entropy(ΔS) decreases while change in free energy(ΔG) increases along with decreasing molar concentration from 0.1 M to 0.125 M. The value of specific constant (K_{sp}), log (K_{sp}) and thermodynamic parameters viz. change in enthalpy (ΔH), change in entropy (ΔS) decreases continuously while ΔG increases with increase in temperature. These parameters are directly influenced by the structure as well as nature of drugs. The change in thermodynamic parameters values are closely affected by the temperature, molar concentration and percentage compositions. This parameters also affected by another factors viz. the solute-solvent interaction, solvent-solvent interaction, solvent-solvent-solute interaction and solute-solute-solvent interaction. Variation in these parameters affected by the internal geometry as well as internal and intra hydrogen bonding.

5. Reference

1. Gonna EA, Al-Jahadalli BN. Am. J Condenced Matter Physics. 2012; 2(1):16-21.
2. Singh NN, Singh TD, Yaiphaba N, Singh NR. Asian J Chem. 2008; 20(3):1750-1759.
3. Solnaki CS, Mishra P, Talari MK, Tripathy M, Dash UM. E-J Chem. 2012; 9(1):21-26.
4. Imran M, Kokab T, Latif S, Liviu M, Mahmood Z. J Chem. Soc. Pak. 2010; 32(2):223-228.

5. Gamal A, Gouda H, Gomaa A, Ali M, Tarek A. Seaf Elnasr. Int. J Nano. Chem. 2015; 1(2):39-44.
6. Mohammed Al Bratty, Hisham Hashem, Noureldeen A, Manoharan G, Towhari F. Int. J of Physical Sciences. 2015; 10(8):276-288.
7. Singh S, Sar SK. Int. J. Current Res. Chem. Pharma. Sci. 2015; 2(5):91-99.
8. Izonfuo WAL, Obunwa CC. Indian. J. Chem. 1999, 38A:939.
9. Roy MN, Nandi D, Hazra DK. J. Ind. Chem. Soc., 1993; 70:121.
10. Shedlovsky T, MacInnes DA, Longworth LG. Nature., 1932; 75:774-775.
11. Singh M, Kumar A. J. Sol. Chem. 2006; 35:567.
12. Edbey K, Bader N, Eltaboni FB, Elabidi A, Albaba S, Ahmed M. Int. Conf. on Advances in Science, Engg., Technology and Natural Resources, 2015, 68-71.