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Variation of Conductance of Potassium Oxalate in Aqueous Solution at 298K

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ABSTRACT

Present studies shows the effect of concentration 0.04 to 0.24 mol dm^{-3} on the conductance of aqueous solutions of potassium oxalate. Arrehenius-Ostwald relation used to analyse the experimental data. The presence of interactions present in solutions have been discussed.

Keywords: *Potassium oxalate, Interaction parameters,Arrhenius- Ostwald relation and conductance.*

I. INTRODUCTION

Survey of literature reveals that although many studies on electrolytes properties in solution have been studies. [1,2,3]. The aqueous oxalic acid solutions have been used to study the behavior of sugars towards the structure of the aqueous medium [4]. The study on aqueous oxalic acid have been carried out to study the nature of intermolecular interaction in solution.[5] The conductance data can give more information which is helpful to investigate the nature of interactions between ions and different species present in solution. In these recent reports no attempt has been made to determine the contribution of ionic components towards B-coefficient and their influence in aqueous solution as structure maker/breaker. The aim of this study is not that of presenting the conductance data but to confirm the nature of particular ion and the role in influencing the water structure.

The conductance of oxalic acid was studied a long time ago which deals with the oxalic acid in solutions by darken [6] Conductances of the oxalic acid were also analyzed [7]. The conductance of salts of oxalic acid, potassium oxalate were also reported [8] in past. Conductivity measurement of oxalic acid and neutral oxalates were performed at different temperature in dilute aqueous solution. [9]

II. EXPERIMENTAL

The potassium oxalate CDH was used in the study. All the solution were prepared in the distilled water and specific conductance was determined at 298K.The density of the solution were measured by using double armed pyknometer. The conductivity measurement were carried out with the help of digital conductivity meter and a dipped type conductivity cell with platinum electrode (cell constant=1)

III. RESULTS AND DISCUSSION

In our previous study [5] the viscometric ,volumetric and conductometric results on dilute aqueous solution of oxalic acid, it was concluded that the oxalic acid has tendency to change the structure of the solvent water in dilute aqueous solution. In dilute aqueous solution both solute-solute and solute-solvent interactions were present. In the study the variation of B-coefficient was also investigated with the concentration of individual

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ions form by the oxalic acid in dilute aqueous solution. In continuation to verify the existence of ions reported from volumetric and viscometric results the conductance measurements were carried out. The values of conductance for potassium oxalate measured at temperature 298K and recorded in Table-1.

Table-1-variation of conductance with concentration of potassium oxalate at 298K

S.No	Conc(mol dm^{-3})	Potassium oxalate	
		κ ($mScm^{-1}$)	1/ λ_m ($s^{-1}cm^{-1}mol$)
1	0.04	7.77	0.0051
2	0.06	11.2	0.0053
3	0.08	14.4	0.0055
4	0.10	17.8	0.0056
5	0.12	21.0	0.0057
6	0.14	24.1	0.058
7	0.16	26.6	0.0060
8	0.18	29.8	0.0060
9	0.22	35.4	0.0062
10	0.24	38.6	0.0062
Slope=		**0.00003 (Scm^{-1})**	
Intercept=		**0.005($S^{-1}cm^{-2}$ mol)**	
Linearity=		**0.9653**	

It is important to consider the role of individual ions rather than of solute itself on influencing ionic interactions in aqueous solutions. viscosity B-coefficient as well as the conductance of the solution are also depends upon the temperature. At higher concentration of the solution the viscosity B-coefficient does not reflects the less structure modification properties of solute the changes in solute-solute, solute-solvent and solvent-solvent interactions and ion association effect with the increase in concentration, which influence the conductance of the solutions. The values of specific conductance were used to calculate the molecular conductance for different concentrations at each temperature. The obtained data was used to calculate the molecular conductance λ_m. These values were again used to calculate the molecular conductance at infinite dilution λ^o_m with the help of Arrehenius–Ostwald relation given by equation

$$1/\lambda_m = 1/\lambda^o_m + c\,\lambda_m K_A/\lambda^0{m^2}$$

Where λ_m is the molar conductance at molar concentration c and K_A is the association constant. The salt of oxalic acid, potassium oxalate is more ionic in nature in comparison to oxalic acid and can be considered as strong electrolyte. The conductance values at infinite dilution for potassium oxalate are the contribution conductance of cation and conductance of anion in solution. The conductance data of potassium oxalate may be useful in the verification of the interaction parameters obtained in case of oxalic acid. The representative plot between c λ_m verses 1 λ_m was used to obtained the value of λ^0_m **and** K_A Molecular conductance λ^0_m has value 200 Scm^{-1}

The value of K_A has significant value 1.20.

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IV. CONCLUSION

The variation of conductance with temperature of potassium oxalate is in the aspected trend at temp 298K is related to an increase in aggregation/association of ions these effects leads to the formation of ion-ion pairs or ionic aggregation. In case of potassium oxalate the values of λ^0_m can be correlated by the difference of ionic molar conductance at infinite dilution.

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