Densities and Viscosities of Sucrose in Aqueous Medium,5%&10% Ethanol- Water Medium at 303.15 K with different concentration.

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ABSTRACT

Densities and viscosities of sucrose in aqueous medium, 5% ethanol-water medium and 10 % ethanol water medium were measured at 303.15 K. The concentration ranges were 0.1-0.9 M. The measurements were carried out using ostwald viscometer. Each data was correlated with concentration and temperature of sucrose solution and interpreted in terms of solute-solvent, interaction.

Keyword :- Sucrose, Ethanol, Water,density, viscosity

INTRODUCTION

Sucrose has the molecular formula $C_{12}H_{22}O_{11}$. It does not reduce Tollen's reagent or Fehlings reagent. Hence it is a non reducing sugar and in this respect it differs from the other disaccharides. Moreover sucrose does not form an osazone does not exist in anomeric forms and does not show mutarotation in solution.All these facts indicate that sucrose does not contain a free aldehyde or ketone group.The viscometric study of lysozyme solution with sugar and urea at various tempratuer[1].The behavior of electrolyte in aqueous carbohydrate solutions recently has been a subject of interest [2-4].viscosity and its derived parameters provide valuable information regarding the shape and size of molecules[7].viscometric and thermodynamic studies of interactions in ternary solutions containing sucrose and aqueous alkali metal halides at 293.15,303.15,313.15 k[8].Aimof present work ,considerable work has not been done on sucrose in different percentage of nonaqueous medium viscometrically.therefore present work is undertaken to make systematic study of sucrose in aqueous and non aqueous medium [water-ethanol]and to determine viscosity.This work also deals with the study of interaction between solute-solvent in different medium. All the chemicals

RESEARCH METHODOLOGY

were A.R. grade sucrose from merck chemicals ethanol from S.D. fine chemical and distilled water. Aqueous solution of sucrose 5% ethanol-water and 10% ethanol-water system were prepared by dissolving required amount of sucrose in distilled water. 5% and 10 % ethanol-water system were prepared of concentration 0.1-0.9 M at temperature 303.15 K.

The density of sucrose solution were determined by a bicapillari (±0.02%) having a bulk volume of about $10cm^3$ and capillary having an internal diameter of 1 mm and calibrated with deionised distilled water at a temperature 303.15 K with concentration 0.1-0.9 M. The viscosities were measured by means of ostwald's viscometer which was kept in equilibrium with elite thermostate water bath (± 0.1°c).sucros solution of different concentration were prepared in aqueous medium, 5%, 10% ethanol-water medium.For each measurement sufficient time was allotted to attend thermal equilibrium in thermostat.

RESULTS AND DISCUSSION

To measure density and viscosity in different concentration of sucrose solution with the help of following mathematical equation.

$$ή=\frac{d_s \times t_s}{d_w \times t_w} \text{x } ή_w \text{----------(1)}$$

Where

ή= Viscosity of sucrose solution.

d_s=Density of sucrose solution.

t_s =Time flow of sucrose solution.

d_w =density of water.

t_w=time flow for water

$\acute{\eta}_w$= Viscosity of Water

Table 1. Density, Viscosity of Sucrose of aqueous solution at 303.15 K.

Conc.	Temp. in K.	ρ (kgm^{-3})	Viscosity
0.1	303.15	1.05733	1.009
0.2	303.15	1.07242	1.2398
0.3	303.15	1.08658	1.4688
0.4	303.15	1.09761	1.6947
0.5	303.15	1.11572	1.9199
0.6	303.15	1.13571	2.1411
0.7	303.15	1.14861	2.3623
0.8	303.15	1.15849	2.5763
0.9	303.15	1.17111	2.7852

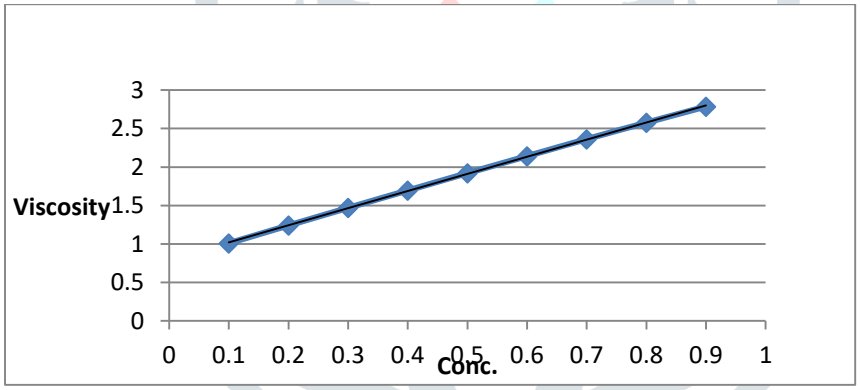


Table 2 : Density Viscosity of 5% Ethanol-Water Solution of Sucrose.

Conc.	Temp. in K.	ρ (kgm^{-3})	Viscosity
0.1	303.15	1.05991	1.0684
0.2	303.15	1.08977	1.2982
0.3	303.15	1.10120	1.5122
0.4	303.15	1.11102	1.7352
0.5	303.15	1.13613	1.9392
0.6	303.15	1.14288	2.1541
0.7	303.15	1.151247	2.3783
0.8	303.15	1.167741	2.5822
0.9	303.15	1.18101	2.8001

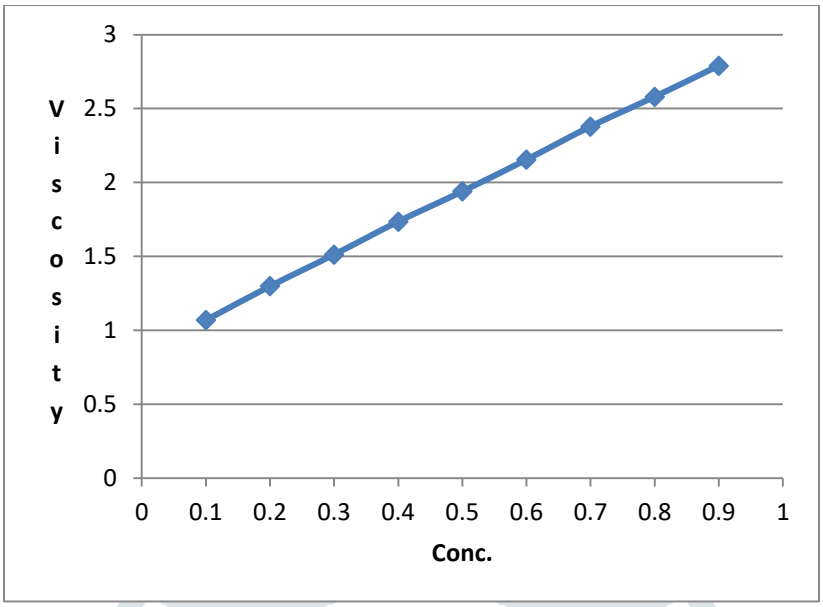
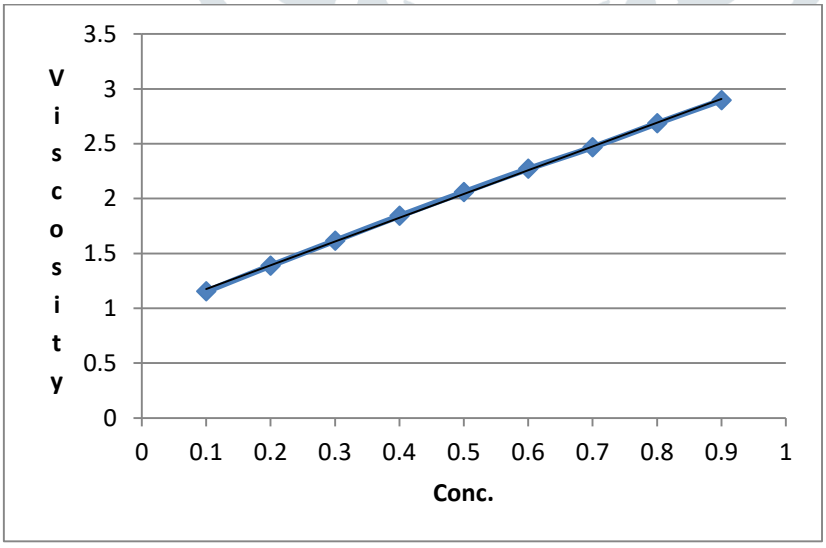


Table 3 : Density Viscosity of 10% Ethanol-Water Solution of Sucrose.

Conc.	Temp. in K.	ρ (kgm^{-3})	Viscosity
0.1	303.15	1.17008	1.1537
0.2	303.15	1.18432	1.3886
0.3	303.15	1.19761	1.6161
0.4	303.15	1.2098	1.8422
0.5	303.15	1.2275	2.0591
0.6	303.15	1.24206	2.2711
0.7	303.15	1.26003	2.4691
0.8	303.15	1.2758	2.6871
0.9	303.15	1.28761	2.8966



The Density, Viscosity of aqueous solutions of sucrose at 303.15K of concentration 0.1-0.9 M are listed in Table1 while 5%, 10%, ethanol-water solution of sucrose at 303.15 K of concentration 0.1- 0.9 are listed in Table 2 and 3. Viscosity increases as shown table 2 and 3 due to increasing the concentration more over a speed or velocity of ions decreases. Hence it conclude

that solute- solvent interaction is more in Table 2 and 3 as compared to Table 1 which conclude that solute- solvent interaction is weak.

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