ORIGINAL RESEARCH PAPER

Chemistry

Volume - 7 | Issue - 1 | January - 2017 | ISSN - 2249-555X | IF : 3.919 | IC Value : 79.96

VISCOMETRIC STUDIES OF 4-(P-TOLYL)THIOCARBAMIDOPHENOL AT VARIOUS MOLAR CONCENTRATIONS AND AT 25^{0}C IN 60 % ETHANOL-WATER MIXTURE

KEYWORDS: 4-(p-tolyl)thiocarbamidophenol, ethanol-water mixture, viscometric measurements.

D.T. Tayade

Department of Chemistry, Government Vidarbha Institute of Science and Humanities, Amravati 444 604. Maharashtra, India.

N. J.Meshram

Department of chemistry, SRRL Science College Morshi, Maharashtra, India.

ABSTRACT *The viscometric studies of 4-(p-tolyl)thiocarbamidophenol, at different molar concentrations (0.1M, 0.05M, 0.025M and 0.012M) by keeping constant temperature (25^{0}C) in 60% ethanol-water system. This viscometric investigations help to study the solute–solute, solute-solvent interactions of solute with solvent and effect of dilution of solvent. This investigation directly gave the information regarding to the pharmacodynamic of this drug.*

Introduction

Viscosity is one of the vital physical property of liquid and solution[1-2]. Aqueous and non aqueous solutions are mass (bulk) phenomena. Mass phenomena engross a variety of types of interactive forces. It endow with concise information about aqueous and non aqueous solute-solute and solute-solvent interactions and information concerning transport property of drugs and ion-solvent interactions, thus for determination of viscosity of an electrolyte in a solution is smart way to obtain data on solute-solute and solute-solvent interactions[3-5]. Electrolytic exchanges in binary liquid mixtures clarify in terms of β-coefficient of viscosity[6]. Measurement of viscosity at various temperatures gives an idea regarding thermodynamic parameters. Thus, all information in a group establishes nature and type of chemical reactions.

Several numbers of properties provide information about the nature of liquid. Viscosity is one of the important physical properties of liquids and solutions. Aqueous and non aqueous solutions are the bulk phenomena which involves various types of interactive forces. It also provides brief information about aqueous and non aqueous solute-solute and solute-solvent interactions and information regarding the transport property of the drugs and ion-solvent interactions. 4-(p-tolyl)thiocarbamidophenol nucleus containing drug create their own identity and importance in drug and pharmaceutical chemistry[7-12].

Materials and Methods

Experimental

All chemicals used in investigation are AR grade. Solutions prepared fresh at each experiment. In this work, all solutions are prepared by using double distilled water. Mechaniki Zaktady Precyzyjnej Gdansk balance (Poland make [±0.001gm]) is used for taking weights and density is measured by Bicapillary method (Internal diameter of bicapillary is of 1 mm). Viscosity measurements are carried out by Ostwald's viscometer. Elite themostatics water bath is used for temperature maintenance. Ample time was allowed to attain thermal equilibrium in between viscometer and water bath.

Present research work is carried out for the viscometric measurements of 4-(p-tolyl) thiocarbamidophenol, at different molar concentrations (0.1M, 0.05M, 0.025M and 0.012M) by keeping constant temperature (25^{0}C) in 60 % ethanol-water system .The viscometric readings were taken as described in literature.

Observations and Calculations

The molecular interactions values in terms of β-coefficient of drugs obtained by viscometric investigation data, which is tabulated in following manner. The result obtained was mentioned in **Table No. 1**. According to Jone's-Dole equation, $(\eta r-1)/\Gamma C = A+\beta\Gamma C$ at different concentration and different percentage. A and β-coefficient values calculated and are enlisted in **Table No.2.**

TABLE NO.1 VISCOSITY MEASUREMENTS AT DIFFERENT CONCENTRATIONS AND DETERMINATION OF RELATIVE AND SPECIFIC VISCOSITIES AT DIFFERENT CONCENTRATIONS AT 25^{0}C

MEDIUM - 60% ETHANOL-WATER							
Temp T(°C)	Conc. C (M)	√C	Time t (sec.)	Density ρx10^{-3} (kg.cm^{-3})	η_r	$\eta_{sp}=\eta_r-1$	$(\eta_r-1)/\sqrt{C}$ (pa s)
25	0.100	0.31622	57.33	0.9561	2.3616	1.3616	4.3074
	0.050	0.22360	58.20	0.9548	2.9939	1.9939	8.9172
	0.025	0.15811	54.24	0.9491	2.2177	1.2177	7.7020
	0.0125	0.11180	56.15	0.9539	2.3079	1.307	11.6956

A and β Co-Efficient Values from Graphs for 60%

TABLE NO.2

W-E Mixture (%)	Temp° C	Mean "A"	β (Slope "m")
60	25	8.1414	-0.3675

Result and Discussion

The relative viscosity was determined by using following formula

$\eta_r = Ds \times ts / Dw \times tw$

And the relative viscosities have been analyzed by Jone's-Doles equation as,

$(\eta r-1)/\Gamma C = A+\beta\Gamma C$ The graphs are plotted between $(\eta r-1)/\Gamma C$ versus ΓC. The graph for each system gave linear straight line gave value of β-coefficient.

In present investigation it is concluded that at constant temperature the density and relative viscosity of drugs decreases along with decreasing concentration as (0.1M, 0.05M, 0.025M and 0.012 M). When concentration decreases the number of solute molecules in solution decreases simultaneously increases percentage of solvent molecule as a result solvation effect increases. From this investigation we can examine the pharmacodynamics of drug. The potency of this drug can be increased by substituting different substituent on the parent drug.

References

1. 1.Singh M. and Kumar A., J. Sol. Chem., 35, 567, 2006.
2. 2.Wu T.Y., Wang H.C., Su S.G., Gung S.T., Lin M.W., and Lin C., J. Taiwan Institute of Chemical Engineers, 41(3), 2010, 315.
3. 3.Patil K.J., Manwatkar S.M. and Dondge S.S., J.Ind. Chem.Soc., 33, 1994, 4.
4. 4.Karia F. and Baluja S., Asian J. Chem., 12 (2), 2000, 593.

Volume - 7 | Issue - 1 | January - 2017 | ISSN - 2249-555X | IF : 3.919 | IC Value : 79.96

5. Wadi R.K. and Kakkar V., J. Ind. Chem. Soc., 39 (6), 2000, 598.
6. Maccarthy, Patrick and Hillz Z.D., J. Chemical Education, 63 (3), 1986, 162.
7. Parajuli R. and Medhi C., Journal of Chemical Sciences, 2004, 116(4), 235-241.
8. U.N.Dash and S.Supkar, Proc.Ind.Acad.Sci.Chem.Soc., 1995, 107,541.
9. E.A.Gonna and B.M, Al-Jahadalli, American Journal Condenced Matter Physics, 2012, 2(1),16-21.
10. W.A.L. Izonfuo and C.C. Obunwa, Indian Journal of Chemistry., 38(A), (1999) 939.
11. M.N. Roy, D.Nandi and D.K. Hazra, Journal of Indian Chemical Society., 70, (1993) 121.
12. M. Imran, T. Kokab, S. Latif, M. Liviu and Z.Mahmood., Journal of Chemical Society, 32(2), (2010) 223-228.