THE VISCOMETRIC MEASUREMENTS OF S-SUBSTITUTED TRIAZINOTHIOCARBAMIDES AT VARIOUS COMPOSITIONS

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Abstract:-

S-Triazine and thiocarbamide group containing drug create their own identity in the drug , pharmaceutical and medicinal sciences in last four decades .Hence, the viscometric measurements of recently synthesized drugs viz. 1-(4-hydroxy)-S-triazino-3-p-methylthiocarbamide(L_1),1-(4-hydroxy)-S-triazino–3-ethylthiocarbamide(L_2) and 1-(4-hydroxy)-S-triazino-3-t-butylthiocarbamide(L_3), were carried out at 28^0C and at various percentage compositions of solvent to investigate effect of structure , group on S-triazinothiocarbamides, The data and result obtained during this investigation gave detail information regarding drug absorption , transmission, activity and effect of these drugs .

Keywords:-

1-(4-Hydroxy)-S-triazino-3-substitutedthiocarbamides,dioxane-water,viscometric measurements.

Introduction:-

In drug chemistry viscometric studies   provides an important and useful information   regarding solute –solute , solute-solvent, solvent–solvent interactions .Viscosity measurements play an important role in pharmaceutical, medicinal and drug chemistry[1-3] The drug absorption, transmission, activity and effect will directly related to viscosity measurements of the solute (drug) and solvent interactions in the human anatomy.   Hence, it was thought interesting to carry out the viscometric measurements of newly synthesized drugs in this laboratory.

This study explores the potency of synthesized drug, stability of drug and also renovates and modifies the traditional drugs which are used by medicinal practitioner.

S-Triazino and thiocarbamideo nucleus containing drugs possess the important applications and significance in drug and pharmaceutical chemistry[4-10] Hence for studying the potency of recently synthesized drugs in this laboratory, the viscosity measurements of 1-(4-hydroxy)-S-triazino-3-p-methylthiocarbamide(L_1),1-(4-hydroxy)-S-triazino–3-ethylthio- carbamide (L_2) and 1-(4-hydroxy)-S-triazino-3-t-butylthiocarbamide(L_3), were studied 28^0C and at various percentage compositions. This study becomes milestone in the drug medicinal, pharmaceutical of triazinothiocarbamides.

Experimental:-

Weighing was made on Mechaniki Zaktady Precyzyjnej Gdansk balance made in Poland ($\pm$ 0.001 gm).Densities of solutions were determined by a bicapillary pyknometer ($\pm$ 0.2 %) having a bulb volume of about 10 cm^3 and capillary having an internal diameter of 1mm and calibrated with deionised doubly distilled water . The accuracy of density measurements were within $\pm$0.1 Kgm^{-3}.The viscosities were measured by means of Ostwald's viscometer thoroughly cleaned and dried. The viscometer was kept in Elite thermostatic water bath and temperature variation was maintained at 28 ^{0}C ($\pm$0.1) for each measurements, sufficient time was allowed to attain thermal equilibrium between viscometer and water bath. All the chemicals used of A.R grade and doubly distilled water was used.

Observations and calculations:-

The present study deals with the viscosity investigation of Ligand (L_1), Ligand (L_2), Ligand (L_3) in 60% , 70% and 80 % dioxane – water mixture at different compositions and at 28^0 C. The data obtained

have been used to compute molecular interactions in terms if β-coefficient of different ligands. The viscometric readings were taken as described in literature[11] .The results obtained was mentioned in Table No, 1-9.

According to Jone's-Dole equation, $(\eta_r-1)\ \sqrt{C} = A + \beta\ \sqrt{C}$ at different concentration and different percentage. A and β-coefficient values calculated and are enlisted in Table No 10-12.

Determination of Relative and Specific Viscosities at Different Concentrations

A] <u>For Ligand L_1</u>

Table No 1:- Dioxane-water (60%)   Temp-28[0] C   System L_1 , Medium:- Dioxane-water

Conc.	$\sqrt{C}$	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta_{sp}= \eta_r-1$ specific Viscosity	$\eta_r-1/\sqrt{C}$
0.1	0.31628	371	1.0238	1.5530	0.5527	1.74843
0.075	0.27389	359	1.0236	1.4986	0.4985	1.81992
0.056	0.23668	344	1.0232	1.4403	0.4403	1.86019
0.042	0.20497	335	1.0229	1.3988	0.3987	1.94499

Table No2:- Dioxane-water (70%)   Temp-28[0] C   System L_1 , Medium:- Dioxane-water

Conc.	$\sqrt{C}$	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta_{sp}= \eta_r-1$ specific Viscosity	$\eta_r-1/\sqrt{C}$
0.1	0.31625	396	1.0289	1.4179	0.4179	1.32121
0.075	0.27388	387	1.0282	1.3791	0.3791	1.38392
0.056	0.23666	374	1.0273	1.3338	0.3339	1.41015
0.042	0.20496	364	1.0258	1.2969	0.2968	1.44776

Table No3:- Dioxane-water (80%)   Temp-28[0] C   System L_1, Medium:- Dioxane-water

Conc.	$\sqrt{C}$	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta_{sp}= \eta_r-1$ specific Viscosity	$\eta_r-1/\sqrt{C}$
0.1	0.31625	414	1.0315	1.3804	0.3804	1.20262
0.075	0.27388	403	1.0294	1.3413	0.3413	1.24586
0.056	0.23666	393	1.0282	1.3054	0.3054	1.29014
0.042	0.20497	385	1.0266	1.2791	0.2791	1.36139

B] For Ligand L_2

Table No 4 :- Dioxane-water (60%)   Temp Temp-28^0 C System L_2,

Medium:- Dioxane-water

Conc.	√C	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta sp= \eta r-1$ specific Viscosity	η_r-1/√C
0.1	0.31625	393	1.03393	1.6609	0.6609	2.08934
0.075	0.27388	376	1.02946	1.5819	0.5819	2.12445
0.056	0.23666	372	1.02612	1.5218	0.5218	2.20418
0.042	0.20495	349	1.02182	1.4695	0.4695	2.28997

TableNo5:-   Dioxane-water(70%)   Temp-28^0 C   System L_2,

Medium:- Dioxane-water

Conc.	√C	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta sp= \eta r-1$ specific Viscosity	η_r-1/√C
0.1	0.31625	426	1.03501	1.5316	0.5316	1.68044
0.075	0.27388	408	1.03103	1.4619	0.4619	1.68588
0.056	0.23666	398	1.02592	1.4185	0.4185	1.76766
0.042	0.20497	391	1.02074	1.3879	0.3879	1.89229

Table No 6:- Dioxane-water (80%)   Temp-28^0 C System L_2,

Medium:- Dioxane-water

Conc.	√C	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta sp= \eta r-1$ specific Viscosity	η_r-1/√C
0.1	0.31625	418	1.0357	1.4069	0.4069	1.28612
0.075	0.27388	415	1.0315	1.3835	0.3836	1.39999
0.056	0.23666	408	1.0263	1.3598	0.3598	1.52087
0.042	0.20495	398	1.0227	1.3236	0.3236	1.57805

C] For Ligand L_3

TableNo7:-Dioxane-water(60%)   Temp-28^0 C   System L_3,

Medium:- Dioxane-water

Conc.	√C	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta sp= \eta r-1$ specific Viscosity	η_r-1/√C
0.1	0.31625	474	1.03602	2.0082	1.00812	3.18759
0.075	0.27388	473	1.03303	1.99785	0.99785	3.64358
0.056	0.23666	449	1.02902	1.88423	0.88422	3.73645
0.042	0.20495	432	1.02404	1.80274	0.80274	3.91689

TableNo8:-Dioxane-water 70%, Temp-28^0 C System L_3

Medium:- Dioxane-water

Conc.	√C	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta sp = \eta r - 1$ specific Viscosity	$\eta_r-1/\sqrt{C}$
0.1	0.31625	488.06	1.03874	1.76441	0.76442	2.41727
0.075	0.27388	470.19	1.03342	1.69113	0.69113	2.52362
0.056	0.23666	451.53	1.02902	1.61701	0.61703	2.60733
0.042	0.20495	443.32	1.02573	1.58227	0.58227	2.84257

TableNo9:- Dioxane-water 80%, Temp-28^0 C System L_3

Medium:- Dioxane-wat**er**

Conc.	√C	Time flow (sec) t	Density 9×10^3	η_r Relative viscosity	$\eta sp = \eta r - 1$ specific Viscosity	$\eta_r-1/\sqrt{C}$
0.1	0.31625	499	1.0397	1.67582	0.67581	2.13709
0.075	0.27388	481	1.0359	1.60967	0.60967	2.22615
0.056	0.23666	469	1.0315	1.56392	0.56392	2.38292
0.042	0.20495	454	1.0276	1.50984	0.50984	2.48769

A-β Coefficient value according to Jone's –Dole Equation at different concentrations and different percentage

Table No 10:-For Ligand L_1

Temp-28^0 C System L_1,

% Dioxane-Water	A- coefficient	β- coefficient
60	1.35979	1.8751
70	1.09338	1.1532
80	0.95262	1.2501

Table No 11:-For Ligand L_2

Temp-28^0 C System L_2,

% Dioxane-Water	A- coefficient	β- coefficient
60	1.8068	1.4282
70	0.98283	3.0003
80	0.95475	2.8752

Table No 12:-For Ligand L$_3$

Temp-28^0 C   System L$_3$,

% Dioxane-Water	A- coefficient	β- coefficient
60	2.07362	6.0001
70	1.53249	4.1302
80	1.52697	3.0303

Result and Discussion:-

The relative viscosity of each solution during study was determined by formula depicted below

$\eta_r = D_s \times t_s / D_\omega \times t_\omega$ Where, η_r = Relative viscosity of ligand solution , D_s and D_ω are Density of ligand solution and density of water, T_s and t_ω = Time of flow for ligand solution and water respectively. The relative viscosities have been analyzed by Jone's-Dole equation

$(\eta_r-1) \sqrt{C} = A + \beta \sqrt{C}$ Where, C is molar concentration of the ligand solution, A-is the Falkenhagen coefficient which is the measure of solute-solute interactions and β-Is the Jones's –Dole coefficients which is the Measure of solute –solvent interactions.

The graph are plotted between **$(\eta_r-1) \sqrt{C}$** versus **$\sqrt{C}$.**The graph for each system gave linear straight line showing validity of Jone's –Dole equation . The slope of straight line gave value of β coefficient.

In the present study, relative viscosity of ligand solutions increases with increase in the concentrations of solute (ligand). This is due to the increase in the relative viscosity with increase in the concentration of ligand which causes much more solute –solvent interactions, and hence the viscous property of that system   increases which clearly indicate that when the percentage of solute increases and hence transmission and absorption of drug decreases in this case, it means that drug activity and effect for that drug is less at higher concentration while at lower concentration these effects are good. This study attributes to increase in solute-solvent interactions and favors homeopathy therapy.

The large and small values of A show the stronger and weaker solute –solute interactions respectively. Solute with positive viscosity β coefficient are characterized as "Structure formers" and will impose a new order by reorientation of the adjacent water molecules. The β coefficient values are positive for all the systems .This showed stronger interactions between solute and solvent .It was observed from Table No 10-12 that A coefficient values of L_3 is comparatively more than L_2 and L_1. This is due to bulkier nature of substituent's groups present on thiocarbamido moiety. From this study it was cleared that when the bulky group is present on ligand then solute –solvent interactions in those system increases and mobility of drug (solute) and transmission decreases .From this study , it was observed that the drug activity and effect of S-triazinothiocarbamide drug will be increase by avoiding the substitutions of bulkier groups in triazinothiocarbamide nucleus . This data is useful to chemist and researcher of pharmaceutical and medicinal sciences.

For the ligand L_1, L_2 and L_3. A and β coefficient values were decreases with increase in percentage of dioxane –water , which indicate that solute-solvent interactions goes on decreasing due to which drug mobility and transmission goes on increasing of solvent .We can say that the drug activity and effect of S- triazinothiocarbamide drugs will be increase in higher percentage of solvent . At the same time, at 60%Dioxane-water.A and β coefficient goes on increasing for the ligand $L_1,L_2,L_3,$ which indicate solute – solvent interaction goes on increases at the same time mobility of drug and transmission goes on decreases . Similarly, result obtained for 70% and 80 % dioxane water mixture. All the three ligand L1, L_2, L_3,have the β **positive** values which indicate that stronger interaction between solute and solvent. At lower concentration the drug activity and effect of triazinothiocarbamides is the best.

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