Electrical Conductivity of Acetyl Acetonyl binylidene 5- Amino Salicylic Acid in Ethanol: Water Mixtures at Different Temperatures

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الخلاصة

يتضمن البحث قياس التوصيلية الكهربائية لمحلول 5- acetyl acetonyl binyledene amino salicylic acid في نسب مختلفة من مزيج الايثانول والماء وعند درجات حرارية مختلفة (283.16ºK - 313.16ºK). تم تحليل النتائج باستخدام معادلة لي – ويتون في التوصيلية وتم حساب ثوابت التوصيلية Λ_o (المواصلة المكافئة عند التخفيف اللانهائي)، K_A (ثابت التجمع الايوني) فضلاً عن **R** (معدل المسافة بين الايونات في المحلول). ومن خلال هذه الدراسة تم الحصول على معلومات مفصلة لحدود التوصيلية المختلفة والتي تتأثر بتغير درجة الحرارة. الدوال الثرموديناميكية ΔH ، ΔG و ΔS تم أيضاً حسابها.

ABSTRACT

The electrical conductivity of acetyl acetonyl binyledene 5- amino salicylic acid has been measured in (ethanol: water) mixtures at different percentage and different temperatures (283.16ºK - 313.16º K).

The results were analyzed by using Lee – Wheaton equation. The conductivity parameters, Λ_o (equivalent conductivity at infinite dilution, K_A (association constant) and **R** (distance parameter between the ions) were calculated. From this study detail information about the conductivity parameters are interpreted Which have been effected by varying the temperatures. Thermodynamic parameters Δ **H**, Δ**G** and Δ **S** were also calculated.

INTRODUCTION

The measurement of electrolytic conductivities of aqueous solutions of electrolytes provides available method of studying the ionic interaction.

Comparison of the Fuoss 1975[1] conductance equation with previous equations shows that the only one which is based on a model which rigorously permits the use of macroscopic dielectric constant D and viscosity η in the theoretical calculation of relaxation field and electophoresis.

Lee and Wheaton describe[2,3,4] the derivation of the conductance equation based on a model identical to that suggested by Fuoss but using a new boundary condition to replace that used by Fuoss.

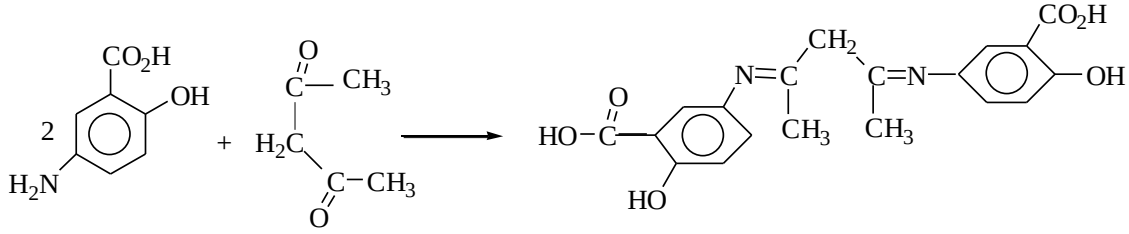
Conductance measurements in binary mixed solvents have been widely used for the investigation of solute – solvent interactions in electrolytes solutions. Many electrolytes solutions in different percentage of solvents mixtures and different temperatures have been studied, Ansari and Islam[5] studied the conductivity and the ionic association of tetraalkylammonium halides in tert-butanol-water mixture at 25°C. Haruhiko, Tomako and Masayasu[6] studied the conductometry of ion association between tris (ethylenediamine) cobalt(III) ion and monovalent anions at temperatures from 0 to 50 °C. Tominic et.al[7] studied the conductometry of hydrobromic acid in 2- propanol and water mixtures. Conductivity of[8] n-tetrabutylammonium tetraphenyl borate in 3-pentanone in the temperature range from 283.15 ºK to 329.15 ºK studied by Tsierkezoz and Molinon. El-Dossoki[9] studied the dissociation of quinic acid and association constants of some quinateions in aqueous and in alcoholic−aqueous mixed solvents.

In this work we have measured the electrical conductivity of acetyl acetonyl binyledene 5- amino salicylic acid has been measured in (ethanol: water) mixtures at different percentage and different temperatures (283.16 ºK - 313.16ºK). The conductivity parameters were calculated using Lee and Wheaton equation.

EXPERIMENTAL

Synthesis of acetyl acetonyl binylidine 5- amino salicylic acid:

This compound was prepared[10] By mixing 0.08 mole (8.0g) of acetyl acetone with 0.16 mole (24.48 g) of 5-amino salicylic acid. In 100 ml round bottom flask, mix the quantities of acetyl acetone and the amounts of 5-amino salicylic acid mentioned. Add to the mixture 150 ml of ethanol. The mixture was reflexed for 6 hours. The product was cooled in ice bath, following by washing the product with cold ethanol and dried.



APPARATUS

Triple distilled water was prepared by distilling water three times, ethanol was of high purity and used directly. The conductivity meter jenway PCM3 was used for measuring the resistance of the solution.

A water thermostat of type HAAKE G3 with thermo bath D3 was used for controlling the temperature of the conductance cell.

Conductivity Measurments

In clean and dry conductivity cell kept at constant temperature 298.16, 100 ml of conductivity water was placed and the conductance of the solvent was measured. Into the cell,a certain amount of the concentrated acetyl acetonyl binyledene 5- amino salicylic acid (10^{-3} M) in aqueous solution was injected into the cell and the conductivity of the solution was measured. This process was repeated generally for about 25 additions. The conductivity of solution was measured at different percentage of ethanol: water mixture and different temperatures by using the same process.

Tables (1-5), shows the solution molarities and the equivalent conductivities of acetyl acetonyl binyledene 5- amino salicylic acid in different percentages of (5, 10, 15, 20, 25% ethanol: water) at different temperatures respectively. The physical properties of solvents used are listed in table (6).

Figures(1-5), illustrate the relation between the molar concentration and the equivalent conductance of acetyl acetonyl binyledene 5- amino salicylic acid in different percentages of (5, 10, 15, 20, 25% ethanol: water) mixtures at different percentage and different temperatures, the figure (6) shows the plot of Walden product against 1/D for acetyl acetonyl binyledene 5- amino salicylic acid in (5, 10, 15, 20, 25% ethanol: water) mixtures at 298ºK. The figures (7-11) shows the plot of the ln (K_A) against 1/T for acetyl acetonyl binyledene 5- amino salicylic acid solution in (5, 10, 15, 20, 25% ethanol: water) mixtures at different temperatures.

RESULTS AND DISCUSSION

For the specific case of solutions containing only a single symmetrical electrolyte this equation has the following general form:

$$\Lambda_{equiv} = f(\Lambda_{\circ}, R, K_A)$$

where $\Lambda_{\circ}$ is equivalent conductance at infinite dilution, R the distance parameter which is defined as the distance between anion and cation at which short range forces become strong enough to impede further approach of the ions allowing the formation of CIP (the formation of contact ion - pair) or SSIP (the formation of solvent – separated ion pair, K_A the pairwise ion association constant.[11]

Lee and Wheaton[4] consider a symmetrical electrolyte MX and they assumed that the solute to be completely dissociated into the species M^{n+} and $X^{n-.}$

The following general equation, Will exit between the two species:

$$M^{n+} + X^{n-} \xleftrightarrow{K_A} MX$$

and if K_A is the pairwise association constant, then:

$$K_A = [MX] / [M^{n+}] [X^{n-}]$$

The model used in this work founded on the lee and wheaton equation:

$$\Lambda = \Lambda_\circ[1 + C_1(\beta_k) + C2(\beta_k)^2 + C_3(\beta_k)^3] - [(\rho K / (1+KR)][1 + C_4(\beta_k) + C_5(\beta_k)^2 + KR/12]$$

With coefficient C_1- C_5, as given by Pethybridge and Taba[12,13] (model LWP), Λ is molar conductivity of electrolyte, $\Lambda_\circ$ is equivalent conductance at infinite dilution, $\beta = 2q$, $K^2 = 16000\pi N_A q C \alpha$, where α is the degree of dissociation, q (Bjerrum parameter)$= e^2 / 8 \pi \varepsilon_\circ \varepsilon_r KT$, where $\varepsilon_\circ$, ε_r is the permitivity, R is the distance parameter.

Using this expression in least – square curve fitting procedure (symmetrical) which was describe by lee and wheaton, all the terms $\Lambda_\circ$, R, K_A can be determined at the minimum value of σ (A) (standard deviation) $= [\Lambda (\Lambda_{equiv}$ calc. $- \Lambda_{equiv}$(experi.))^2 Np$]^{1/2}$ where Np is the number of points of measurements.

The input data to computer program are:

Temperature (T), Dielectric constant (D), and Viscosity η, Assosiation constant K_A and limiting equivalent conductivity $\Lambda_\circ$ and R, together with the solution conductivities and the corresponding equivalent conductance.

In the five mixed solvent composition, the limiting equivalent conductance $\Lambda_\circ$ decrease by increasing the % wt of alcohol every the dielectric constant of the medium decreasing this is because characteristic of alcohol become more predominate[5].

As we show in tables (1-5) the equivalent conductivity values are increase by increasing temperature this is because incrasing the kinetic energy of molecules,break up hydrogen bonds and decreasing the viscosity [14] as we show in table(6).

Tables (7 –11) shows the values of K_A incrsase with increasing the percentage of alcohol in each mixture, this due to the decreasing of the dielectric constant by increasing the percentage of alcohol[15]. In the other side K_A values decrease with increasing temperature this because increasing the kinetic energy of molecules, break the electrostatic bonds and because the reciprocal reactions[16]. The values of R indicates the formation of contact ion –pair in each mixtures, The values of σ (A) are

small indicating the good applicability of the conductivity equation used L.W equation.

The case in the behaviour of the present system as indicated in figure(6) shows that the ions suffers various degree of salvation with different mixtures of ethanol and water mixtures, the value of Walden product ($\eta_{\circ}\Lambda_{\circ}$) would be constant only if the effective radius of the ion remains the same in the different media. Hames[17] suggest that the measure deviation in the Walden product is due to the variation of the electrochemical equilibrium between ions and the solvent molecules with the composition of the mixed polar solvents.

Thermodynamic parameters that calculated by using ln K_A and 1/T values that listed in table(12) shows in table (13) that Δ H had negative signs, this indicated that the association reaction is exothermic, ΔG values had negative signs that's referes to spontaneous the association reaction[18,19], while Δ S values had positive signs this because of the structure of the compound in case of salvation.

Table 1: The equivalent conductance Λ (Ω^{-1}. $equiv^{-1}$.cm^2) and the square root of molar concentration ($mol.L^{-1}$)*10^2 for acetyl acetonyl binyledene 5- amino salicylic acid in a mixture of (5% ethanol + 95% water) at 283.16 ºK – 313.16 º K

283.16 K		293.16 K		298.16 K		303.16 K		308.16 K		313.16 K	
√ C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ
0.61967	64.2812	0.86023	61.475676	1.03489	79.6991	1.03489	83.6501	0.61967	99.4062	0.86023	111.6486
0.86023	47.1405	1.03489	53.5238	1.1743	61.7621	1.1743	75.1501	0.86023	91.1108	1.03489	92.7619
1.03489	42.5714	1.1743	49.6316	1.29073	54.9795	1.29073	71.7551	1.03489	82.3809	1.1743	78.5525
1.1743	38.4626	1.29073	46.5306	1.47885	45.9862	1.39104	66.5767	1.1743	75.2240	1.29073	71.8163
1.29073	35.5714	1.39104	45.4914	1.55692	43.2995	1.47885	60.2112	1.29073	70.7755	1.39104	65.6279
1.39104	34.8961	1.47885	43.2812	1.62696	40.9618	1.55692	55.8391	1.39104	67.8418	1.47885	63.1028
1.47885	33.9067	1.55692	41.1955	1.69026	38.8792	1.62696	52.6762	1.47885	61.7969	1.55692	62.7821
1.55692	33.2846	1.62696	39.8058	1.74785	38.0955	1.69026	49.6254	1.55692	57.4801	1.62696	62.5024
1.62696	32.4457	1.69026	38.2366	1.80083	37.6799	1.74785	43.7715	1.62696	57.4544	1.69026	59.3363
1.69026	31.1319	1.74785	37.7617	1.84959	37.5381	1.80083	42.9639	1.69026	55.6233	1.74785	58.7968
1.74785	30.7836	1.80083	37.1452	1.89446	36.6904	1.84959	42.0999	1.74785	54.0216	1.80083	58.3181
1.80083	30.4144	1.84959	36.3455	1.93649	35.8561	1.89446	41.1239	1.84959	51.7603	1.84959	56.8266
1.84959	30.6208	1.89446	35.7241	1.97534	35.3418	1.93649	40.1480	1.89446	51.4689	1.89446	56.2542
1.89446	30.4664	1.93649	34.9326	2.01171	35.2601	1.97534	39.7073	1.93649	51.2308	1.93649	55.7509
1.93649	29.9344	1.97534	34.3746	2.04597	34.9178	2.01171	39.6204	1.97534	50.7124	1.97534	55.3616
1.97534	29.5386	2.01171	33.8739	2.07797	34.8661	2.04597	39.4013	2.01171	50.4581	2.01171	55.3228
2.01171	29.2868	2.04597	33.2852	2.1080	34.4284	2.07797	39.2362	2.04597	50.2689	2.04597	55.1314
2.04597	28.8748	2.07797	33.0236	2.1365	34.2308	2.1080	39.0877	2.07797	49.8188	2.07797	54.7872
2.07797	28.7244	2.1080	32.5693			2.1365	38.8113	2.1080	48.7965		54.3318
		2.1365	32.5104			2.1633	38.5115	2.1365	48.6650		54.1972
		2.1633	32.4089			2.1883	38.3218	2.1633	48.5153		2.1080
		2.1883	32.3180			2.2129	38.1172	2.1883	48.2216		2.1365
								2.2129	48.0318		

Table 2: The equivalent conductance Λ (Ω^{-1}. $equiv^{-1}$.cm^2) and the square root of molar concentration ($mol.L^{-1}$) *10^2 for acetyl acetonyl binyledene 5- amino salicylic acid in a mixture of (10% ethanol + 90% water) at 283.16 ºK -313.16 ºK

283.16 K		293.16 K		298.16 K		303.16 K		308.16 K		313.16 K	
√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ
1.1743	39.3502	0.86023	54.9405	0.61967	65.1687	1.03489	70.5714	1.03489	73.0523	0.86023	95.1783
1.29073	35.6326	1.03489	46.4761	0.86023	57.2324	1.1743	62.0580	1.29073	60.1020	1.03489	79.5238
1.39104	32.7875	1.1743	44.0101	1.03489	55.9047	1.29073	54.0000	1.47885	49.2636	1.1743	69.6026
1.47885	30.6419	1.29073	39.9183	1.1743	48.0783	1.39104	44.1736	1.55692	46.3237	1.29073	62.0204
1.55692	28.6980	1.39104	37.8480	1.29073	41.8775	1.47885	40.8559	1.62696	43.3280	1.39104	50.2883
1.62696	27.2436	1.47885	35.9588	1.39104	36.0573	1.55692	40.1856	1.69026	41.0927	1.47885	46.6392
1.69026	25.7409	1.55692	33.8316	1.47885	32.4663	1.62696	39.1507	1.74785	40.9001	1.55692	46.3292
1.74785	24.9073	1.62696	33.5247	1.55692	32.2326	1.69026	36.8085	1.80083	40.7937	1.62696	46.1267
1.80083	23.9666	1.69026	32.5600	1.62696	32.2145	1.74785	36.2258	1.84959	40.5793	1.69026	46.1267
1.84959	23.3159	1.74785	31.6183	1.69026	31.9173	1.80083	35.0379	1.89446	40.2998	1.74785	45.9083
1.89446	23.2192	1.80083	31.0120	1.74785	31.4180	1.84959	34.9143	1.93649	39.9579	1.80083	45.7002
1.93649	23.0620	1.84959	30.2034	1.80083	31.3894	1.89446	34.6157	1.97534	39.7857	1.84959	45.5287
1.97534	22.7944	1.89446	30.1538	1.84959	31.1277	1.93649	34.3078	2.01171	39.2928	1.89446	45.3017
2.01171	22.7086	1.93649	29.7443	1.89446	30.8643	1.97534	34.1655	2.04597	39.2064	1.93649	45.2005
2.04597	22.2957	1.97534	29.6955	1.93649	30.5592	2.01171	33.9747	2.07797	39.0236	1.97534	45.0661
2.07797	22.2283	2.01171	29.3624	1.97534	30.3751	2.04597	33.6751	2.10807	38.9500	2.01171	44.9636
2.1080	22.1489	2.04597	28.8260	2.01171	30.3202	2.07797	33.3307	2.1365	38.8560	2.04597	44.6889
2.1365	22.0534	2.07797	28.6299	2.04597	30.1419	2.10807	33.1201	2.1633	38.7294	2.07797	44.5039
		2.1080	28.4608	2.07797	29.9527	2.1633	32.8666	2.1883	38.3218	2.10807	44.3897
		2.1365	28.2203	2.10807	29.6314	2.1883	32.5948	2.21291	38.3046	2.13658	44.1069
		2.1633	28.2243			2.2129	32.4725	2.23606	38.1276	2.16333	43.8948
						2.23606	32.3952			2.1883	43.7294
										2.21291	43.6160
										2.23606	43.5336

Table 3:The equivalent conductance Λ (Ω^{-1}. $equiv^{-1}$.cm^2) and the square root of molar concentration ($mol.L^{-1}$) *10^2 for acetyl acetonyl binyledene 5- amino salicylic acid in a mixture of (15% ethanol + 85% water) at 283.16 º K -313.16 º K

283.16 K		293.16 K		298.16 K		303.16 K		308.16 K		313.16 K	
√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ
0.61967	45.6368	0.61967	49.2187	0.86023	58.8837	0.86023	58.0567	1.03489	67.14285	0.86023	93.984
0.86023	38.5945	0.86023	45.2108	1.03489	52.3809	1.1743	52.8861	1.1743	59.83901	1.03489	74.4761
1.03489	33.0476	1.03489	37.7142	1.1743	42.4568	1.29073	48.7959	1.29073	50.08163	1.1743	62.9456
1.1743	28.4771	1.1743	34.0986	1.29073	36.4285	1.39104	43.1720	1.39104	44.75348	1.29073	54.4285
1.29073	26.6938	1.29073	29.3265	1.39104	33.6837	1.47885	39.0370	1.47885	41.78875	1.39104	47.8635
1.39104	24.0372	1.39104	26.4620	1.47885	31.0617	1.55692	36.3985	1.55692	38.67079	1.47885	42.6748
1.47885	23.8792	1.47885	24.3923	1.55692	29.1608	1.62696	33.7944	1.62696	35.72119	1.55692	39.5965
1.55692	22.5123	1.55692	24.2376	1.62696	27.5519	1.69026	31.8102	1.69026	33.95239	1.62696	36.8386
1.62696	21.3479	1.62696	24.0838	1.69026	26.2765	1.74785	30.8504	1.74785	33.62160	1.69026	36.7371
1.69026	21.2068	1.69026	24.0273	1.74785	25.8422	1.80083	29.9740	1.80083	33.40240	1.74785	36.4929
1.74785	21.0677	1.74785	23.5384	1.80083	25.6336	1.84959	29.7562	1.84959	33.00613	1.80083	36.2960
1.80083	20.3811	1.80083	22.8344	1.84959	25.2838	1.89446	29.5001	1.89446	32.93898	1.84959	36.0473
1.84959	20.1555	1.84959	22.4215	1.93649	25.1234	1.93649	29.3640	1.93649	32.51504	1.89446	35.8662
1.89446	20.1214	1.89446	22.1677	1.97534	24.8820	1.97534	29.1727	1.97534	32.12660	1.93649	35.5573
1.93649	19.9925	1.93649	21.8940	2.01171	24.8595	2.01171	29.0096	2.01171	32.00889	1.97534	35.3418
1.97534	19.8928	1.97534	21.5397	2.04597	24.3469	2.04597	28.8017	2.04597	31.99378	2.01171	35.1593
2.01171	19.5833	2.01171	21.1712		24.1963	2.07797	28.5590	2.07797	31.62992	2.04597	34.8690
2.04597	19.5422	2.04597	21.0774			2.10807	28.3001	2.10807	31.19216	2.07797	34.6535
2.07797	19.2519					2.13658	28.1756	2.13658	30.49945	2.10807	34.3366
2.10807	18.7979					2.16333	28.0717	2.16333	30.33846	2.13658	34.2308
2.13658	18.6348					2.1883	28.0388	2.1883	30.14652	2.16333	34.0435
2.16333	18.3512					2.21291	27.9317	2.21291	30.01470	2.1883	33.8509
						2.23606	27.8868			2.21291	33.6389
										2.23606	33.4764

Table 4:The equivalent conductance Λ (Ω^{-1}. $equiv^{-1}$.cm^2) and the square root of molar concentration ($mol.L^{-1}$) *10^2 for acetyl acetonyl binyledene 5- amino salicylic acid in a mixture of (20 % ethanol + 80% water) at 283.16 ºK -313.16 ºK

283.16 K		293 K		298 K		303 K		308 K		313 K	
√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ
0.61967	44.0156	0.61967	45.5125	0.86023	51.5100	0.86023	52.1459	0.86023	52.1459	0.86023	52.1459
0.86023	31.427	0.86023	38.3513	1.03489	46.9380	1.1743	44.4174	1.1743	44.4174	1.1743	44.4174
1.03489	22.4761	1.03489	30.9523	1.39104	30.6790	1.29073	40.3061	1.29073	40.3061	1.29073	40.3061
1.1743	17.5982	1.1743	25.3705	1.47885	28.7297	1.39104	37.0031	1.39104	37.0031	1.39104	37.0031
1.29073	17.7142	1.29073	23.3877	1.55692	27.5618	1.47885	34.9327	1.47885	34.9327	1.47885	34.9327
1.39104	17.9767	1.39104	22.5085	1.62696	25.9335	1.55692	32.1064	1.55692	32.1064	1.55692	32.1064
1.47885	16.3497	1.55692	20.6608	1.69026	24.8484	1.62696	30.0566	1.62696	30.0566	1.62696	30.0566
1.55692	16.2873	1.62696	20.2304	1.74785	23.7387	1.69026	28.1687	1.69026	28.1687	1.69026	28.1687
1.62696	16.2228	1.69026	20.1715	1.80083	22.9287	1.74785	26.6435	1.74785	26.6435	1.74785	26.6435
1.69026	15.7801	1.74785	19.8324	1.84959	22.2128	1.80083	25.3506	1.80083	25.3506	1.80083	25.3506
1.74785	15.6255	1.80083	19.5948	1.89446	21.5140	1.84959	24.9260	1.84959	24.9260	1.84959	24.9260
1.80083	15.1285	1.84959	19.3504	1.93649	20.9976	1.89446	24.7255	1.89446	24.7255	1.89446	24.7255
1.84959	14.9079	1.89446	19.3257	1.97534	20.8077	1.93649	24.4202	1.93649	24.4202	1.93649	24.4202
1.89446	14.6079	1.93649	19.0418	2.01171	20.6167	1.97534	24.1537	1.97534	24.1537	1.97534	24.1537
1.93649	14.3424	1.97534	18.9518	2.04597	20.5900	2.01171	23.9688	2.01171	23.9688	2.01171	23.9688
1.97534	14.2988	2.01171	18.6256	2.10807	20.1291	2.04597	23.8552	2.04597	23.8552	2.04597	23.8552
2.01171	14.1645	2.04597	18.1046	2.13658	19.9978	2.07797	23.7401	2.07797	23.7401	2.07797	23.7401
2.04597	14.1328	2.04597	18.1046	2.16333	19.8115	2.10807	23.6638	2.10807	23.6638	2.10807	23.6638
2.10807	13.7943			2.1883	19.6080	2.13658	23.4387	2.13658	23.4387	2.13658	23.4387
2.13658	13.6521			2.21291	19.5793	2.16333	23.3858	2.16333	23.3858	2.16333	23.3858
2.16333	13.4692			2.23606	19.3596						
2.1883	13.3061			2.21291	19.5793						
				2.23606	19.3596						

Table 5:The equivalent conductance Λ (Ω^{-1}. $equiv^{-1}$.cm^2) and the square root of molar concentration ($mol.L^{-1}$) *10^2 for acetyl acetonyl binyledene 5- amino salicylic acid in a mixture of (25 % ethanol + 75% water) at 283.16 º K -313.16 ºK

283.16 K		293.16 K		298.16 K		303.16 K		308.16 K		313.16 K	
√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ	√C	Λ
1.03489	20.4761	0.6197	39.3221	0.86023	44.7142	0.86023	44.7142	0.86023	55.6837	0.8602	60.1729
1.1743	17.5300	0.86023	34.3216	1.1743	38.0159	1.1743	38.0159	1.03489	48.4761	1.1743	43.3799
1.29073	15.3673	1.03489	27.1904	1.29073	32.5918	1.29073	32.5918	1.1743	41.8651	1.29073	38.3265
1.39104	13.8635	1.1743	23.1515	1.39104	29.9937	1.39104	29.9937	1.29073	36.1836	1.39104	33.7364
1.47885	13.0589	1.29073	20.7551	1.47885	26.7709	1.47885	26.7709	1.39104	32.9984	1.47885	30.2222
1.55692	12.8341	1.39104	19.6093	1.55692	24.5321	1.55692	24.5321	1.47885	30.3621	1.62696	25.6325
1.62696	12.0997	1.47885	18.2359	1.62696	22.8507	1.62696	22.8507	1.55692	28.4034	1.69026	25.3482
1.69026	11.6030	1.55692	17.9257	1.69026	21.5995	1.69026	21.5995	1.62696	26.4344	1.74785	25.1076
1.74785	11.2851	1.62696	17.6871	1.74785	21.2346	1.74785	21.2346	1.69026	24.9555	1.84959	24.9856
1.80083	11.0083	1.69026	17.1368	1.80083	20.6012	1.80083	20.6012	1.74785	23.5718	1.89446	24.8960
1.84959	10.8231	1.74785	17.0612	1.84959	20.3940	1.84959	20.3940	1.80083	23.3691	1.93649	24.6375
1.89446	10.7996	1.80083	16.9213	1.89446	20.1499	1.89446	20.1499	1.84959	23.2265	1.97534	24.5197
1.93649	10.7025	1.84959	16.3688	1.93649	20.0468	1.93649	20.0468	1.89446	23.1908	2.01171	24.3217
1.97534	10.5607	1.89446	16.1142	1.97534	19.8928	1.97534	19.8928	1.93649	23.0348	2.04597	24.2694
2.01171	10.2579	1.93649	16.0537	2.01171	19.8606	2.01171	19.8606	1.97534	22.9513	2.07797	24.0472
2.04597	9.9904	1.97534	15.8672	2.04597	19.7372	2.04597	19.7372	2.01171	22.6078	2.10807	24.0310
2.07797	9.7795	2.0117	15.5003	2.07797	19.5826	2.07797	19.5826	2.04597	22.3932	2.13658	23.8633
2.1080	9.7088	2.04597	15.0587	2.10807	19.3946	2.10807	19.3946	2.07797	22.1574	2.16333	23.5820
2.1365	9.5855			2.13658	19.3721	2.13658	19.3721	2.10807	22.1030	2.1883	23.3550
2.1633	9.5243			2.16333	19.2230	2.16333	19.2230	2.13658	22.0087	2.21291	23.1202
								2.16333	21.8166		
								2.1883	21.6731		

Table 6: Viscosity and Dielectric constant of ethanol: water mixture at different temperatures.

5% ethanol + 95% water						
	283º K	293º K	298º K	303º K	308º K	313º K
Viscosity $Kg.m^{-1}s^{-1}$	0.01314	0.010119	0.008978	0.008077	0.007289	0.006619
Dielectric constant	80.97	77.4	75.6	73.9	72.3	70.6
10% ethanol + 90% water						
	283º K	293º K	298º K	303º K	308º K	313º K
Viscosity $Kg.m^{-1}s^{-1}$	0.01322	0.010218	0.009053	0.008180	0.007385	0.006670
Dielectric constant	78.1	74.7	72.9	71.3	69.7	68.0
15% ethanol + 85% water						
	283º K	293º K	298º K	303º K	308º K	313º K
Viscosity $Kg.m^{-1}s^{-1}$	0.01330	0.010317	0.009128	0.008283	0.007481	0.006740
Dielectric constant	75.3	71.9	70.2	68.6	67.1	65.443
20% ethanol + 80% water						
	283º K	293º K	298º K	303º K	308º K	313º K
Viscosity $Kg.m^{-1}s^{-1}$	0.01338	0.010416	0.009203	0.008386	0.007577	0.006811
Dielectric constant	72.4	69.2	67.5	66.0	64.6	62.9
25% ethanol + 75% water						
	283º K	293º K	298º K	303º K	308º K	313º K
Viscosity $Kg.m^{-1}s^{-1}$	0.01346	0.010515	0.009278	0.008488	0.007673	0.006888
Dielectric constant	69.5	66.5	64.8	63.4	62.0	60.3

Table 7: $\Lambda_\circ$, K_A, R and σ (A) for acetonyl binyledene 5- amino salicylic acid in (5% ethanol +95% water) mixture at 283.16ºK-313.16º K.

T (K)	$\Lambda_\circ$	K_A	R(A°)	σ (A)
283.16	80.334	13503.526	2	0.017
293.16	97.902	13469.909	2	0.036
298.16	101.221	12792.639	2.1	0.047
303.16	113.036	12314.768	2.1	0.064
308.16	137.476	11829.684	2	0.027
313.16	150.291	11568.877	2	0.033

Table 8: Λ_o, K_A, R and σ (A) for acetonyl binyledene 5- amino salicylic acid in (10 % ethanol + 90% water) mixture at 283.16ºK - 313.16º K.

T (K)	Λ_o	K_A	R(Å)	σ (A)
283.16	78.291	32687.297	2.1	0.042
293.16	93.291	17997.181	2	0.066
298.16	94.877	17392.300	2	0.023
303.16	107.103	15275.268	2	0.035
308.16	120.294	15143.531	2	0.024
313.16	123.238	11905.800	2	0.046

Table 9: Λ_o, K_A, R and σ (A) for acetonyl binyledene 5- amino salicylic acid in (15 % ethanol + 85% water) mixture at 283.16ºK - 313.16º K.

T (K)	Λ_o	K_A	R(Å)	σ (A)
283.16	76.495	30347.975	2	0.071
293.16	84.267	29797.746	2	0.013
298.16	85.979	25028.226	2	0.053
303.16	105.993	21959.535	2	0.021
308.16	115.361	21364.948	2.1	0.030
313.16	117.526	16500.401	2.2	0.059

Table 10: Λ_o, K_A, R and σ (A) for acetonyl binyledene 5- amino salicylic acid in (20% ethanol+ 80% water)mixture at 283.16ºK-313.16º K.

T (K)	Λ_o	K_A	R(Å)	σ (A)
283.16	70.398	48892.998	2	0.019
293.16	82.560	42277.029	2	0.011
298.16	85.553	38706.509	2.1	0.048
303.16	109.094	34849.735	2	0.018
308.16	111.154	30201.613	2.1	0.032
313.16	115.150	26610.890	2.1	0.037

Table 11: Λ_o, K_A, R and σ (A) for acetonyl binyledene 5- amino salicylic acid in (25 % ethanol + 75% water) mixture at 283.16ºK - 313.16º K.

T (K)	Λ_o	K_A	R(Å)	σ (A)
283.16	61.898	74073.408	2	0.051
293.16	80.145	55918.429	2	0.017
298.16	84.247	40994.235	2	0.017
303.16	93.636	38851.117	2	0.016
308.16	101.694	32932.044	2.69	0.028
313.16	103.858	31395.991	2	0.027

Table 12: ln K_A and (1/T)*10^3 K^{-1} for acetonyl binyledene 5- amino salicylic acid in ethanol: water) mixtures at different temperatures.

5% ethanol + 95% water						
ln K_A	9.510	9.508	9.456	9.418	9.378	9.356
(1/T)*10^3 K^{-1}	3.531	3.411	3.353	3.298	3.245	3.193
10% ethanol + 90% water						
ln K_A	10.394	9.797	9.763	9.633	9.625	9.384
(1/T)*10^3 K^{-1}	3.531	3.411	3.353	3.298	3.245	3.193
15% ethanol + 85% water						
ln K_A	10.320	10.302	10.127	9.996	9.969	9.711
(1/T)*10^3 K^{-1}	3.531	3.411	3.353	3.298	3.245	3.193
20% ethanol + 80% water						
ln K_A	10.797	10.651	10.563	10.458	10.315	10.189
(1/T)*10^3 K^{-1}	3.531	3.411	3.353	3.298	3.245	3.193
25% ethanol + 75% water						
ln K_A	11.212	10.931	10.621	10.567	10.402	10.354
(1/T)*10^3 K^{-1}	3.531	3.411	3.353	3.298	3.245	3.193

Table 13: Thermodynamic parameters of acetyl acetonyl binyledene 5- amino salicylic acid solution in ethanol: water mixtures and different temperatures.

5% ethanol + 95% water						
	283º K	293º K	298º K	303º K	308º K	313º K
$-\Delta H(KJ.mol^{-1})$	4.220	4.220	4.220	4.220	4.220	4.220
$-\Delta G(KJ.mol^{-1})$	22.390	23.174	23.442	23.739	24.027	24.359
$\Delta S(J.mol^{-1}.K^{-1})$	64.166	64.654	64.466	64.383	64.275	64.308
10% ethanol + 90% water						
$-\Delta H(KJ.mol^{-1})$	22.124	22.124	22.124	22.124	22.124	22.124
$-\Delta G(KJ.mol^{-1})$	24.471	23.880	24.203	24.282	24.660	24.434
$\Delta S(J.mol^{-1}.K^{-1})$	8.289	5.992	6.974	7.118	8.230	7.377
15% ethanol + 85% water						
$-\Delta H(KJ.mol^{-1})$	14.625	14.625	14.625	14.625	14.625	14.625
$-\Delta G(KJ.mol^{-1})$	24.296	25.109	25.105	25.197	25.542	25.284
$\Delta S(J.mol^{-1}.K^{-1})$	34.153	35.763	35.149	34.871	35.425	34.035
20% ethanol + 80% water						
$-\Delta H(KJ.mol^{-1})$	14.954	14.954	14.954	14.954	14.954	14.954
$-\Delta G(KJ.mol^{-1})$	25.419	25.962	26.186	26.361	26.429	26.528
$\Delta S(J.mol^{-1}.K^{-1})$	36.955	37.547	37.669	37.624	37.234	36.957
25% ethanol + 75% water						
$-\Delta H(KJ.mol^{-1})$	22.180	22.180	22.180	22.180	22.180	22.180
$-\Delta G(KJ.mol^{-1})$	26.397	26.644	26.328	26.635	26.650	26.958
$\Delta S(J.mol^{-1}.K^{-1})$	14.890	15.225	13.912	14.693	14.506	15.258

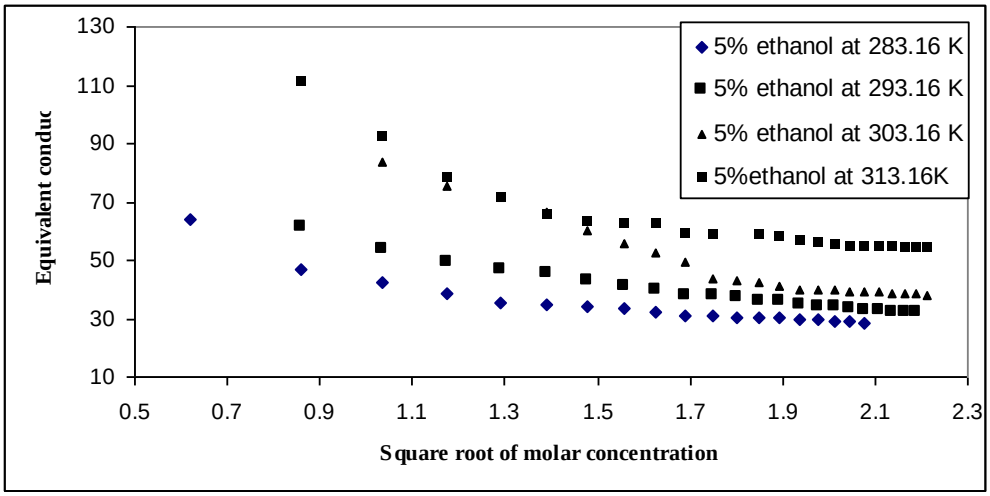


Figure 1: The plot of equivalent conductivity against the square root of molar concentration of acetyl acetonyl binyledene 5- amino salicylic acid in (5 %ethanol +95% water) at different temperatures.

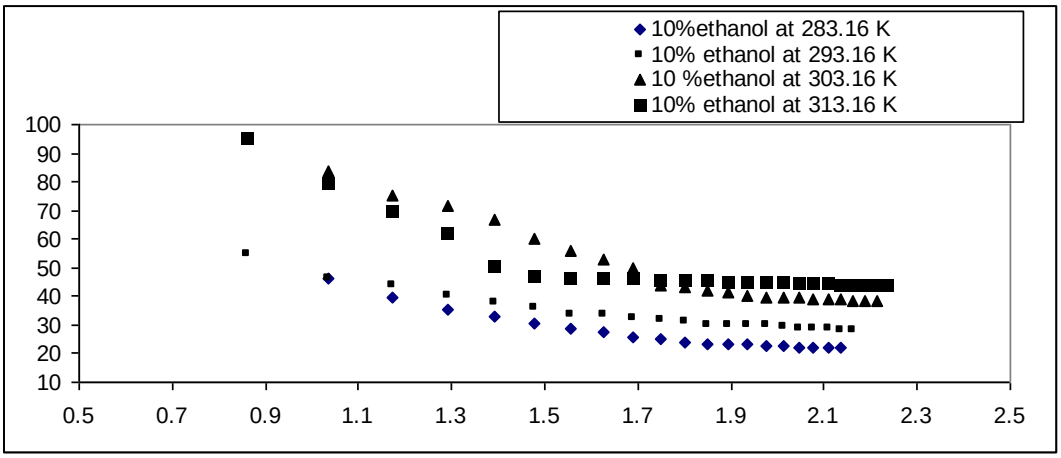


Figure 2: The plot of equivalent conductivity against the square root of molar concentration of acetyl acetonyl binyledene 5- amino salicylic acid in (10 %ethanol +90% water) at different temperatures

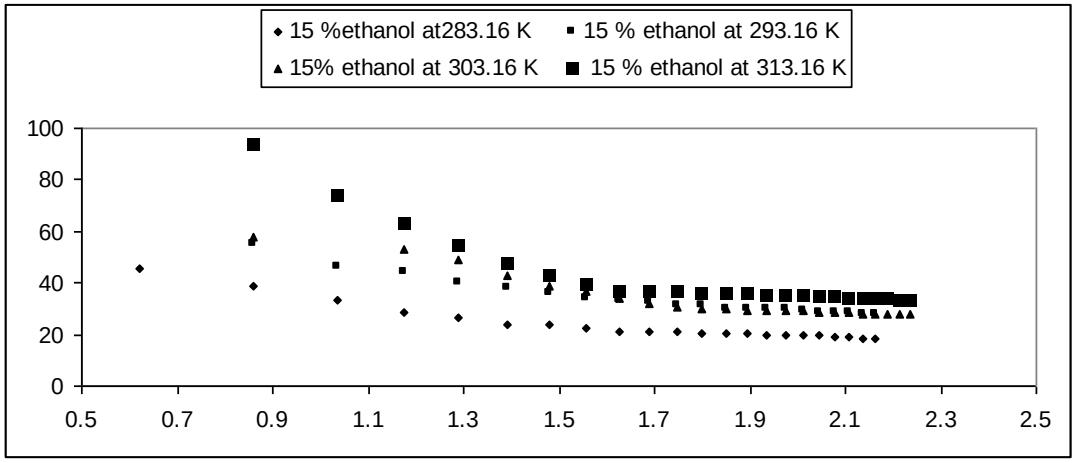


Figure 3: The plot of equivalent conductivity against the square root of molar concentration of acetyl acetonyl binyledene 5- amino salicylic acid in (15 %ethanol +85 %water) at different temperatures

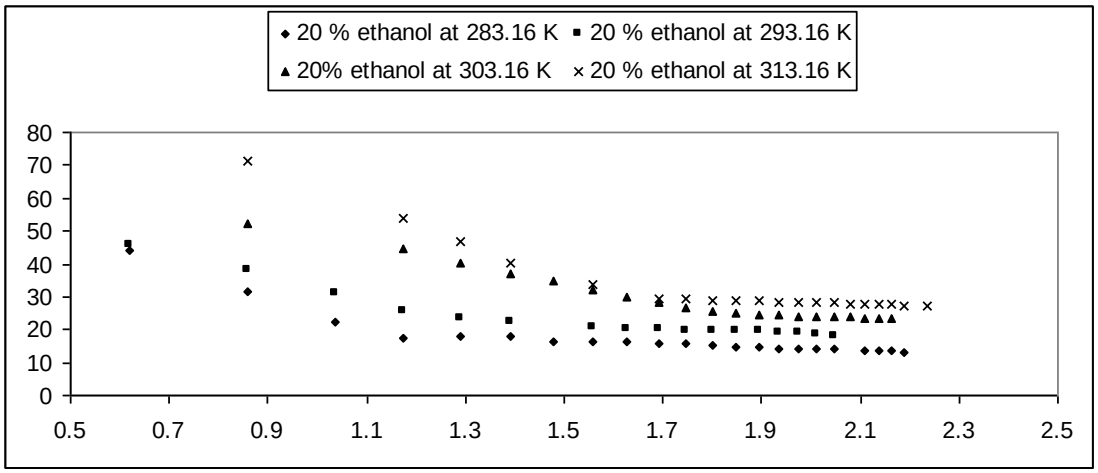


Figure 4: The plot of equivalent conductivity against the square root of molar concentration of acetyl acetonyl binyledene 5- amino salicylic acid in (20 %ethanol +80% water) at different temperatures

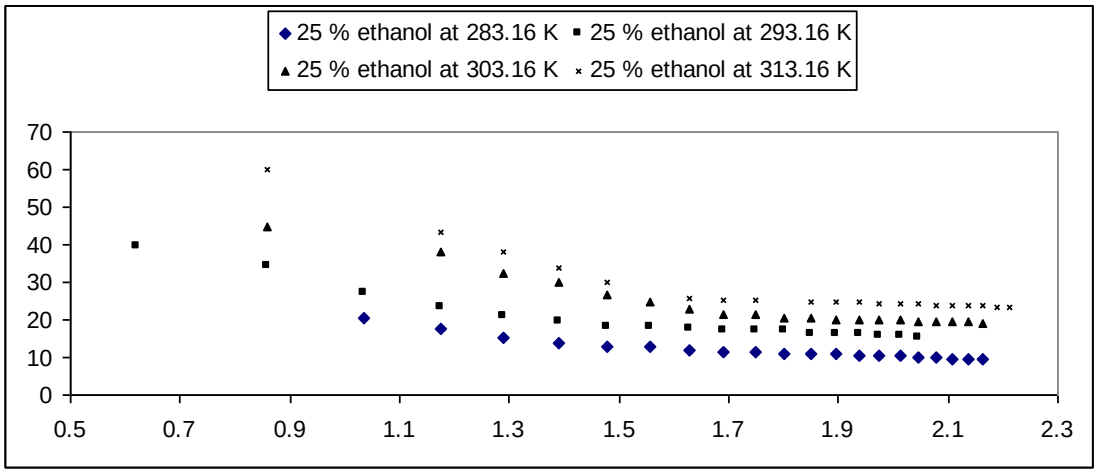


Figure 5: The plot of equivalent conductivity against the square root of molar concentration of acetyl acetonyl binyledene 5- amino salicylic acid in (25 %ethanol +75% water) at different temperatures

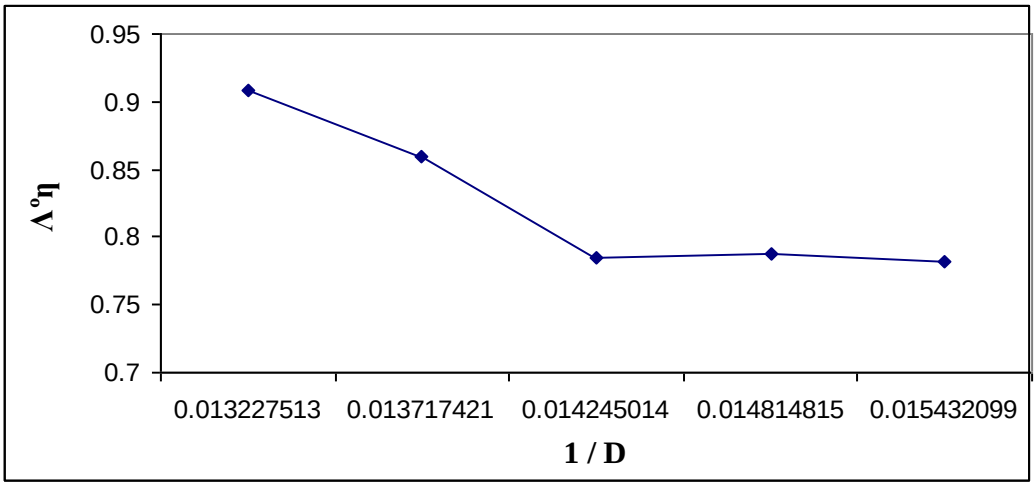


Figure 6: The plot of the Walden product against 1/D for acetyl acetonyl binyledene 5- amino salicylic acid in ethanol: water mixtures at 298ºK.

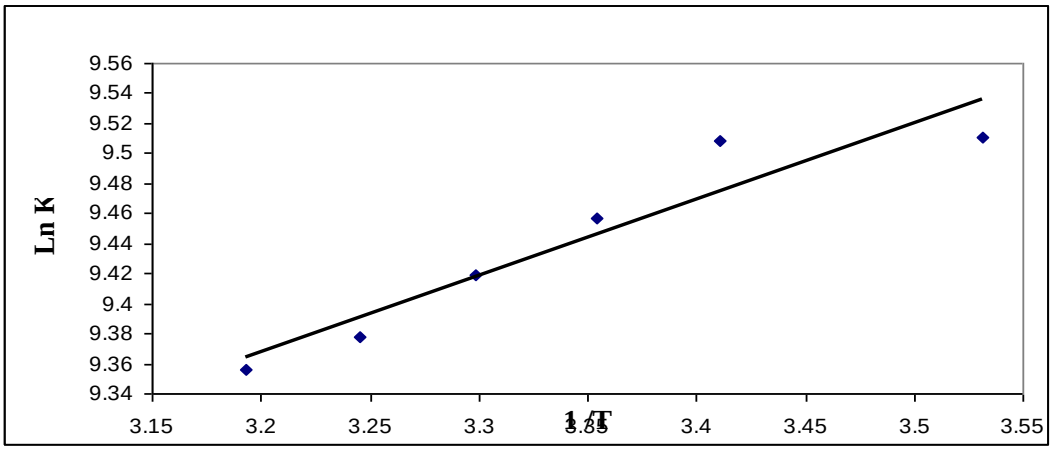


Figure 7: The plot of ln (K_A) against 1/T *10^3 for acetyl acetonyl binyledene 5-amino salicylic acid solution in 5% ethanol + 95% water mixture at different temperatures.

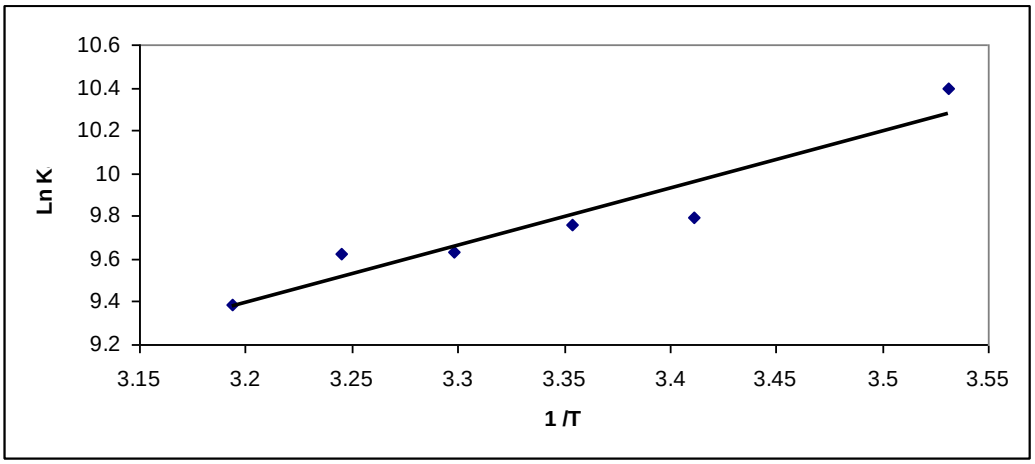


Figure 8: The plot of ln (K_A) against 1/T *10^3 for acetyl acetonyl binyledene 5-amino salicylic acid solution in 10% ethanol +90% water mixture at different temperatures.

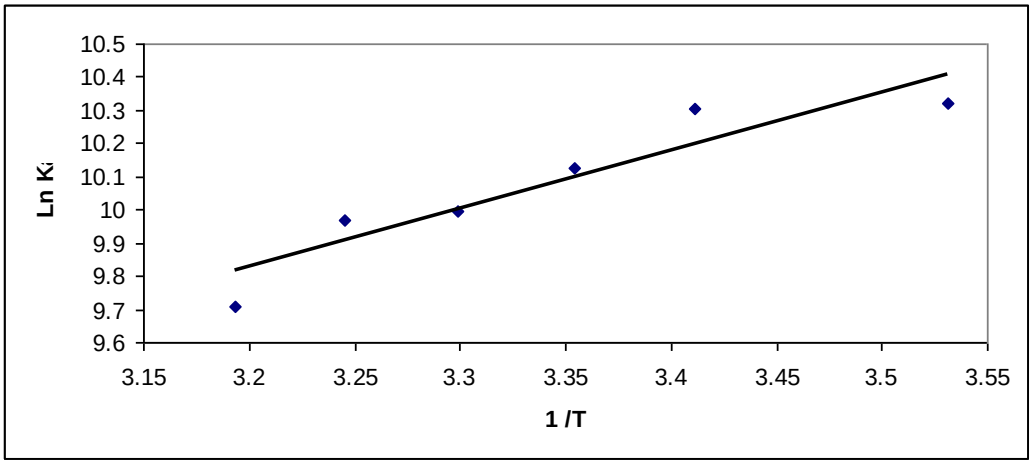


Figure 9: The plot of ln (K_A) against 1/T *10^3 for acetyl acetonyl binyledene 5-amino salicylic acid solution in 15% ethanol +85% water mixture at different temperatures.

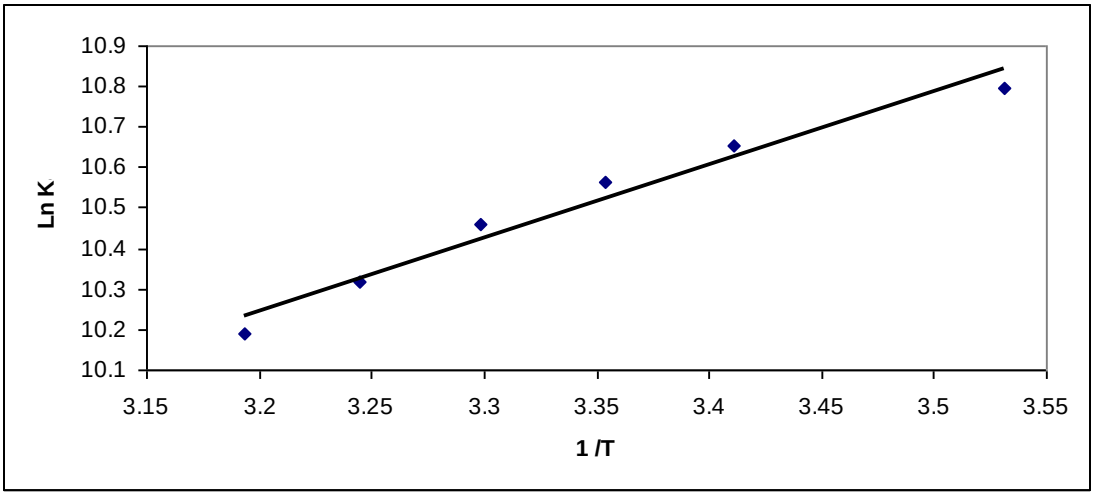


Figure 10: The plot of ln (K_A) against 1/T *10^3 for acetyl acetonyl binyledene 5-amino salicylic acid solution in 20% ethanol +80% water mixture at different temperatures.

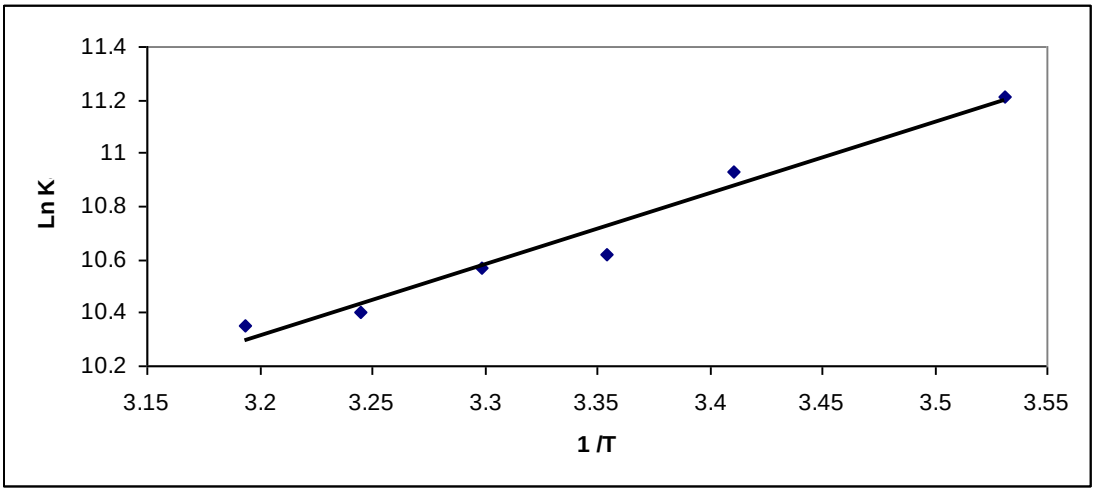


Figure 11: The plot of ln (K_A) against 1/T *10^3 for acetyl acetonyl binyledene 5-amino salicylic acid solution in 25% ethanol +75% water mixture at different temperatures.

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