"SPECTRAL STUDY OF O-BENZO QUINONE WITH AQUEOUS WESTRON AND ACETONE AS ORGANIC SOLVENT"

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ABSTRACT

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Excess Viscosity (η) , specific acoustic Impedance (τ) , Rao's Constant (R) , Shear's Relaxation Time (τ_s) , Apparent molal adiabatic Compressibility ($\mathcal{E}_k$) , and Excess Value (A^E) , Ultrasonic velocity , Density and viscosity measurements have been used to calculate Isentropic Compressibility (β_S) , Intermolecular free length (L_f) , Ultrasound velocity (V) , Density (ρ) of solution of O-Benzo Quinone in aqueous organic solvents such as WESTRON and Acetone. In each case ultrasound velocity increase and isentropic compressibility (β_S) Decreases , Intermolecular free length (L_f), Density (ρ) increase and viscosity decreases with increases in molar concentration of O-Benzo Quinone. As Usual apparent molal adiabatic compressibility ($\mathcal{E}_k$), has been found to be negative. The Result has been interpreted in terms of ion-solvent interaction on the basis of acoustic properties.

INTRODUCTION

Quinones- Any class of Aromatic yellow compounds including several that are biologically important as coenzymes or acceptors or vitamins; use in making dyes. Quinones are a class of natural and synthetic compounds that have several beneficial effects. Quinones are electron carriers playing a role in photosynthesis. As vitamins, they represent a class of molecules preventing and treating several illnesses.

Present work covers extensive survey of physic-chemical and solvolytic studies of some Quinones in aqueous organic solvents such as WESTRON & ACETONE system study at various temp. (30^0C, 35^0C, 40^0C) with various parameter. Qualitative determination of the degree of association in liquids to study the behavior of binary liquid mixture by measuring the sound velocity and related properties. Present work is reporting of the dissolved ion with water molecules and reporting the finding of a study of a ultrasound velocity , density and viscosity measurement to calculate isentropic compressibility(β_S) , intermolecular free length (L_f) , molar volume (M_v) , Rao's Constant (R) , apparent molar adiabatic compressibility ($\mathcal{E}_k$) , Shear's Relaxation Time (τ_s) of Quinone in solvent. Wave interferometric technique was employed for the measurement of ultrasonic Velocity. The Density and Viscosity were determined using a vibrating

dentiometer. The Experiment was repeated and results were reproducible with experimental error of 0.0002 KgM^{-3} and 0.0002 mPas respectively.

Result and Discussion -

Present work covers an extensive survey of physic-chemical and solvolytic study of Quinone in aqueous organic solvent such as WESTRONE and ACETONE. All the system studied at various temperatures (30, 35, 40^0C).we have reported ultrasound velocity (V) and Viscosity (η) of binary liquid mixture with experimental data , The following thermodynamic and acoustic properties like Isentropic compressibility (β_S) , intermolecular free length (L_f) , Molar Volume (M_v) , Shear's Relaxation Time (τ_s) have been calculated. The ultrasound velocity and concentration and Molar sound velocity Reported in Table 1-6 as well on Fig. 1-8. The ultrasound velocity of the solution of O-Benzo Quinone in WESTRONE and ACETONE increase with increasing Molar Concentration of O-Benzo Quinone in WESTRONE and ACETONE Solvents.

Table 1: O-Benzo Quinone + WESTRONE at 30 ^{0} C

Isentropic Compressibility of WESTRONE = 89.94 $x10^{12}$ dyne/cm^2

C(mole/L)	ρ(gm/ml)	V (m/sec)	$\beta S(cm^2/dyne.10^{12})$	$\beta SO-\beta S$ $(cm^2/dyne.10^{12})$	η (CP)	ηSP (CP)	τ_s (Sec)	$Zx10^{-5}$	R (m/sec)	S_n	L_f	$\beta_S-\beta_{SO}/C$ (10^{12})	M_v
0.0216	1.5646	1320	36.68	53.26	0.2693	0.0058	18.2856	2.0652	2822.54	9.8691	0.3822	- 2465.6233	43.4496
0.0432	1.5667	1322	36.52	53.42	0.2693	0.0116	18.3104	2.0712	2827.87	9.8990	0.3813	- 1236.5472	43.5379
0.0649	1.5689	1324	36.36	53.58	0.2689	0.0174	18.3348	2.0772	2833.20	9.9287	0.3805	- 825.5665	43.7243
0.0865	1.5710	1326	36.20	53.74	0.2690	0.0233	18.3588	2.0832	2838.53	9.9553	0.3797	- 621.2573	43.7874
0.1081	1.5732	1328	36.04	53.90	0.2690	0.0291	18.3823	2.0892	2843.87	9.9876	0.3788	- 498.5875	43.8602
0.1297	1.5754	1330	35.89	54.05	0.2691	0.0349	18.4053	2.0952	2849.20	10.0169	0.3780	- 416.7691	43.9376
0.1513	1.5775	1332	35.73	54.21	0.2691	0.0407	18.4279	2.1013	2854.54	10.0459	0.3772	- 358.3058	44.0176
0.1730	1.5797	1334	35.57	54.37	0.2690	0.0465	18.4501	2.1073	2859.88	10.0748	0.3763	- 314.2628	44.1358
0.1946	1.5819	1336	35.42	54.52	0.2690	0.0523	18.4719	2.1134	2865.23	10.1035	0.3755	- 280.1766	442142
0.2162	*1.5840*	*1338*	*35.26*	54.68	0.2690	0.0582	18.4932	2.1194	2870.58	10.1320	0.3747	- 252.8971	44.2940

Table 2: O-Benzo Quinone + WESTRONE at 35 ^{0} C

Isentropic Compressibility of WESTRONE = 90.52 $x10^{12}$ dyne/cm^2

C(mole/L)	ρ(gm/ml)	V(m/sec)	$\beta S(cm^2/dyne.10^{12})$	$\beta SO-\beta S$ $(cm^2/dyne.10^{12})$	η (CP)	ηSP (CP)	τ_s (Sec)	$Zx10^{-5}$	R (m/sec)	S_n	L_f	$\beta_S-\beta_{SO}/C$ (10^{12})	M_v
0.0216	1.5509	1308	37.69	52.83	0.2922	0.0063	17.3198	2.0285	2789.32	9.7274	0.3909	- 2445.8927	43.8348
0.0432	1.5530	1310	37.52	53.00	0.2921	0.0126	17.3511	2.0345	2794.63	9.7582	0.3899	- 1226.8190	43.9246
0.0649	1.5552	1312	37.36	53.16	0.2918	0.0189	17.3819	2.0404	2799.95	9.7888	0.3890	- 819.1817	44.1134
0.0865	1.5573	1314	37.19	53.33	0.2919	0.0252	17.4122	2.0464	2805.26	9.8192	0.3882	- 616.5343	44.1779
0.1081	1.5595	1316	37.03	53.49	0.2920	0.0316	17.4419	2.0523	2810.58	9.8495	0.3873	- 494.8616	44.2521
0.1297	1.5617	1318	36.86	53.66	0.2920	0.0379	17.4712	2.0583	2815.90	9.8796	0.3864	- 413.7083	44.3310
0.1513	1.5638	1320	36.70	53.82	0.2920	0.0442	17.5000	2.0643	2821.23	9.9095	0.3856	- 355.7197	44.4125
0.1730	1.5660	1322	36.54	53.98	0.2919	0.0505	17.5284	2.0702	2826.55	9.9392	0.3847	- 312.0339	44.5324
0.1946	1.5682	1324	36.38	54.14	0.2919	0.0568	17.5562	2.0762	2831.88	9.9688	0.3839	- 278.2240	44.6122
0.2162	*1.5703*	*1326*	*36.22*	54.30	0.2920	0.0631	17.5836	2.0822	2837.22	9.9982	0.3831	- 251.1655	44.6935

Table 3: O-Benzo Quinone + WESTRONE at 40 ^{0} C

Isentropic Compressibility of WESTRONE = 91.12 x 10^{12} dyne/cm^2

C(mole/L)	ρ(gm/ml)	V(m/sec)	βS(cm^2/dyne.10^{12})	βSO-βS (cm^2/dyne.10^{12})	η (CP)	ηSP (CP)	τ_s (Sec)	Zx10^{-5}	R (m/sec)	S_n	L_f	$\beta_S - \beta_{SO}/C$ (10^{12})	M_v
0.0216	1.5281	1294	39.08	52.04	0.3145	0.0068	16.6996	1.9773	2738.47	9.5180	0.4014	- 2409.1096	44.4911
0.0432	1.5302	1296	38.91	52.21	0.3145	0.0136	16.7367	1.9832	2743.76	9.5501	0.4005	- 1208.6192	44.5837
0.0649	1.5324	1298	38.73	52.39	0.3140	0.0204	16.7733	1.9890	2749.05	9.5820	0.3996	- 807.1939	44.7766
0.0865	1.5345	1300	38.56	52.56	0.3141	0.0272	16.8093	1.9949	2754.34	9.6138	0.3987	- 607.6344	44.8434
0.1081	1.5367	1302	38.39	52.73	0.3142	0.0340	16.8448	2.0008	2759.64	9.6453	0.3978	- 487.8152	44.9200
0.1297	1.5389	1304	38.22	52.90	0.3142	0.0408	16.8797	2.0067	2764.93	9.6767	0.3969	- 407.8971	45.0014
0.1513	1.5410	1306	38.05	53.07	0.3143	0.0475	16.9144	2.0126	2770.23	9.7078	0.3960	- 350.7909	45.0855
0.1730	1.5432	1308	37.88	53.24	0.3141	0.0543	16.9480	2.0185	2775.53	9.7388	0.3951	- 307.7691	45.2085
0.1946	1.5454	1310	37.71	53.41	0.3141	0.0611	16.9814	2.0244	2780.84	9.7696	0.3942	- 274.4730	45.2908
0.2162	*1.5475*	*1312*	*37.54*	53.58	0.3142	0.0679	17.0142	2.0303	2786.15	9.8002	0.3934	- 247.8254	45.3746

Table 4: O-Benzo Quinone + ACETONE at 30 ^{0} C

Isentropic Compressibility of ACETONE = 95.59 x10^{12} dyne/cm^2

C(mole/L)	ρ(gm/ml)	V(m/sec)	βS(cm^2/dyne.10^{12})	βSO-βS (cm^2/dyne.10^{12})	η (CP)	ηSP (CP)	τ_s (Sec)	Zx10^{-5}	R (m/se)	S_n	L_f	$\beta_S - \beta_{SO}/C$ (10^{12})	M_v
0.0216	0.7796	1162	95.00	0.59	0.1703	0.0037	40.2130	0.9058	862.77	0.1023	0.6150	- 27.1670	10.7758
0.0432	0.7817	1164	94.42	1.17	0.2437	0.0105	40.2361	0.9099	865.66	0.2048	0.6131	- 27.1819	11.1302
0.0649	0.7839	1166	93.83	1.76	0.2683	0.0174	40.2586	0.9140	868.56	0.3066	0.6112	- 27.0985	11.4833
0.0865	0.7861	1168	93.25	2.34	0.2805	0.0243	40.2792	0.9181	871.45	0.4074	0.6093	- 27.0140	11.8349
0.1081	0.7882	1170	92.68	2.91	0.2878	0.0311	40.2985	0.9222	874.34	0.5074	0.6075	- 26.9189	12.1835
0.1297	0.7904	1172	92.11	3.48	0.2927	0.0380	40.3166	0.9263	877.24	0.6065	0.6056	- 26.8188	12.5302
0.1513	0.7925	1174	91.55	4.04	0.2962	0.0448	40.3335	0.9304	880.13	0.7048	0.6037	- 26.7162	12.8751
0.1730	0.7947	1176	90.99	4.60	0.2988	0.0517	40.3500	0.9346	883.05	0.8025	0.6019	- 26.6035	13.2196
0.1946	0.7969	1178	90.43	5.16	0.3009	0.0585	40.3645	0.9387	885.95	0.8991	0.6001	- 26.5000	13.5607
0.2162	*0.7990*	*1180*	*89.88*	5.71	0.3025	0.0654	40.3779	0.9428	888.85	0.9950	0.5982	- 26.3961	13.8999

Table 5: O-Benzo Quinone + ACETONE at 35 ^{0} C

Isentropic Compressibility of ACETONE = 103.23 x10^{12} dyne/cm^2

C(mole/L)	ρ(gm/ml)	V(m/sec)	βS(cm^2/dyne.10^{12})	βSO-βS (cm^2/dyne.10^{12})	η (CP)	ηSP (CP)	τ_s (Sec)	Zx10^{-5}	R (m/sec)	S_n	L_f	$\beta_S - \beta_{SO}/C$ (10^{12})	M_v
0.0216	0.7608	1132	102.58	0.65	0.1930	0.0042	38.3455	0.8612	834.66	0.1051	0.6447	- 30.1278	11.0518
0.0432	0.7629	1134	101.93	1.30	0.2762	0.0119	38.3957	0.8652	837.52	0.2102	0.6426	- 30.1313	11.4240
0.0649	0.7651	1136	101.28	1.95	0.3041	0.0197	38.4452	0.8691	840.39	0.3146	0.6406	- 30.0206	11.7958
0.0865	0.7673	1138	100.64	2.59	0.3179	0.0275	38.4922	0.8731	843.26	0.4179	0.6385	- 29.9209	12.1637
0.1081	0.7694	1140	100.01	3.22	0.3262	0.0353	38.5375	0.8771	846.13	0.5203	0.6365	- 29.8106	12.5296
0.1297	0.7716	1142	99.38	3.85	0.3317	0.0430	38.5814	0.8811	849.00	0.6218	0.6345	- 29.6954	12.8935
0.1513	0.7737	1144	98.75	4.48	0.3357	0.0508	38.6237	0.8851	851.87	0.7225	0.6325	- 29.5779	13.2553
0.1730	0.7759	1146	98.14	5.09	0.3387	0.0586	38.6653	0.8892	854.76	0.8226	0.6305	- 29.4494	13.6168
0.1946	0.7781	1148	97.52	5.71	0.3410	0.0664	38.7046	0.8932	857.64	0.9215	0.6286	- 29.3313	13.9745
0.2162	*0.7802*	*1150*	*96.91*	6.32	0.3428	0.0741	38.7424	0.8973	860.52	1.0197	0.6266	- 29.2129	14.3304

Table 6: O-Benzo Quinone + ACETONE at 40 ^{0} C

Isentropic Compressibility of ACETONE = 107.58 x10^{12} dyne/cm^2

C(mole/L)	ρ(gm/ml)	V(m/sec)	βS(cm^2/dyne.10^{12})	βSO-βS (cm^2/dyne. 10^{12})	η (CP)	ηSP (CP)	τ_s (Sec)	Zx10^{-5}	R (m/sec)	S_n	L_f	$\beta_S - \beta_{SO}/C$ (10^{12})	M_v
0.0216	0.7512	1116	106.89	0.69	0.2152	0.0046	32.8026	0.8383	820.22	0.1068	0.6638	- 31.9207	11.1983
0.0432	0.7533	1118	106.20	1.38	0.3269	0.0141	32.8974	0.8422	823.07	0.2133	0.6616	- 31.8744	11.5801
0.0649	0.7555	1120	105.52	2.06	0.3643	0.0236	32.9912	0.8461	825.93	0.3191	0.6595	- 31.7394	11.9613
0.0865	0.7577	1122	104.84	2.74	0.3828	0.0331	32.0819	0.8501	828.79	0.4238	0.6574	- 31.6243	12.3387
0.1081	0.7598	1124	104.17	3.41	0.3940	0.0426	33.1706	0.8540	831.64	0.5276	0.6553	- 31.5011	12.7139
0.1297	0.7620	1126	103.51	4.07	0.4014	0.0521	33.2573	0.8580	834.50	0.6304	0.6532	- 31.3745	13.0870
0.1513	0.7641	1128	102.85	4.73	0.4067	0.0615	33.3420	0.8619	837.36	0.7324	0.6511	- 31.2463	13.4580
0.1730	0.7663	1130	102.20	5.38	0.4107	0.0711	33.4257	0.8659	840.24	0.8337	0.6490	- 31.1073	138286
0.1946	0.7685	1132	101.55	6.03	0.4138	0.0805	33.5065	0.8699	843.10	0.9340	0.6470	- 30.9795	14.1954
0.2162	*0.7706*	*1134*	*100.91*	6.67	0.4163	0.0900	33.5855	0.8739	845.97	1.0334	0.6449	- 30.8517	14.5601

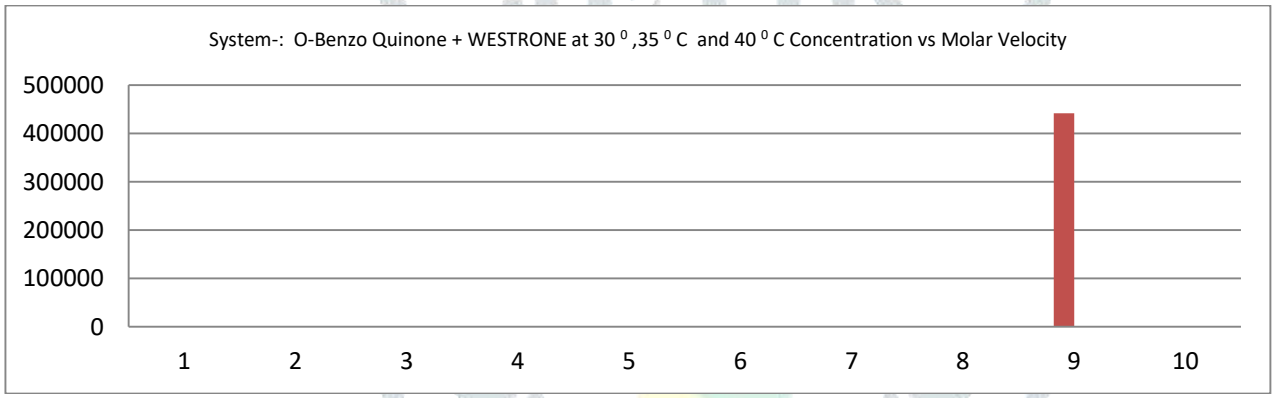

Fig.-1

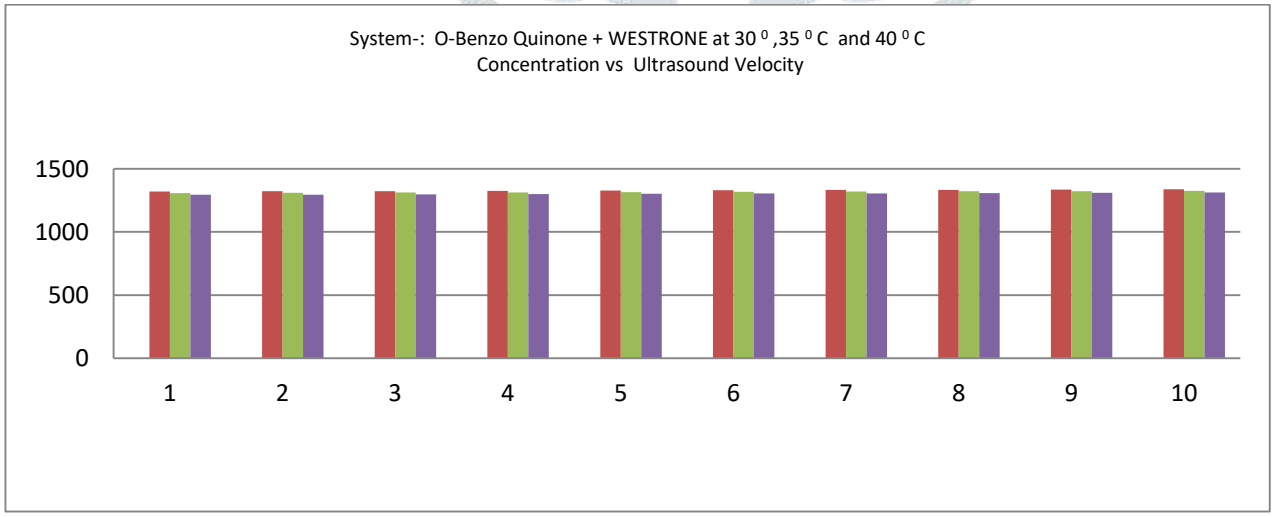

Fig.-2

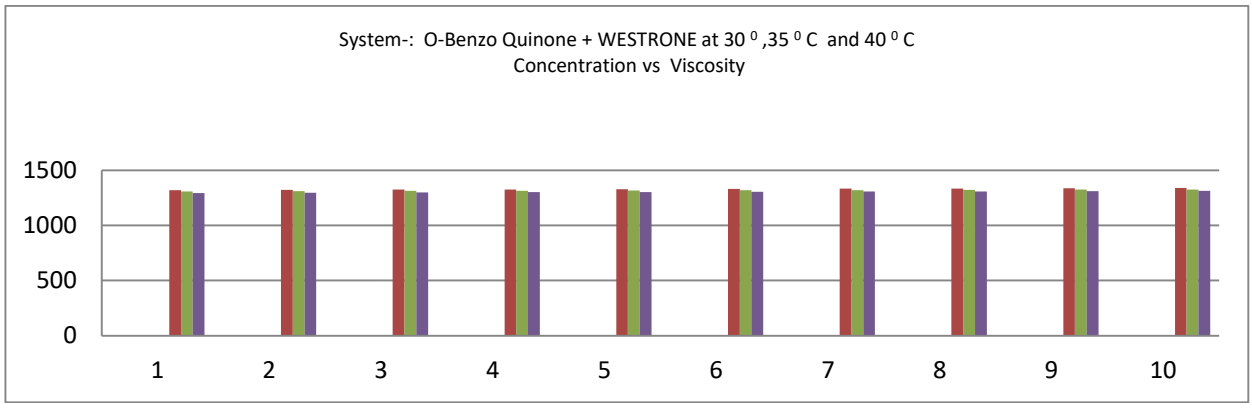

Fig.-3

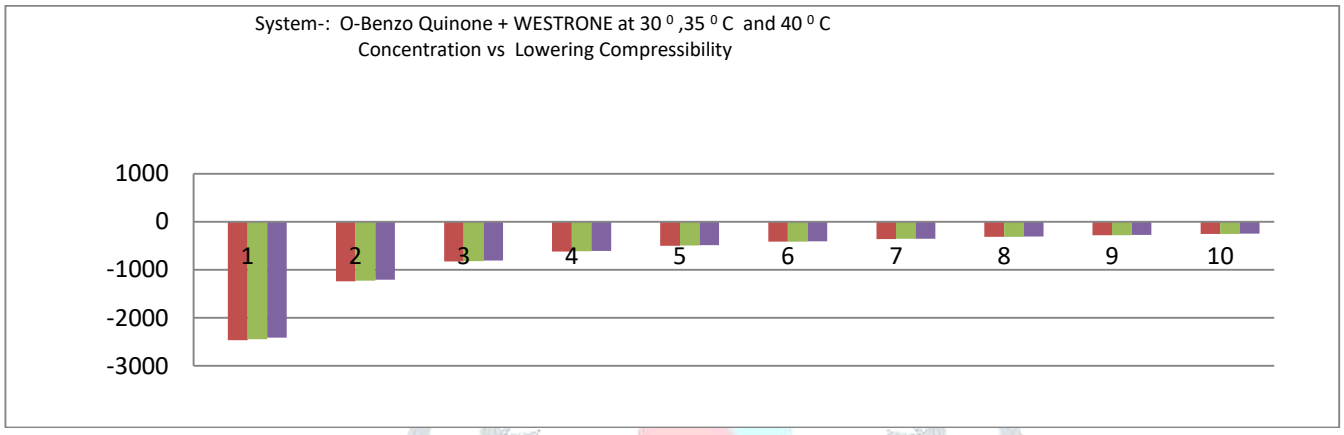

Fig.-4

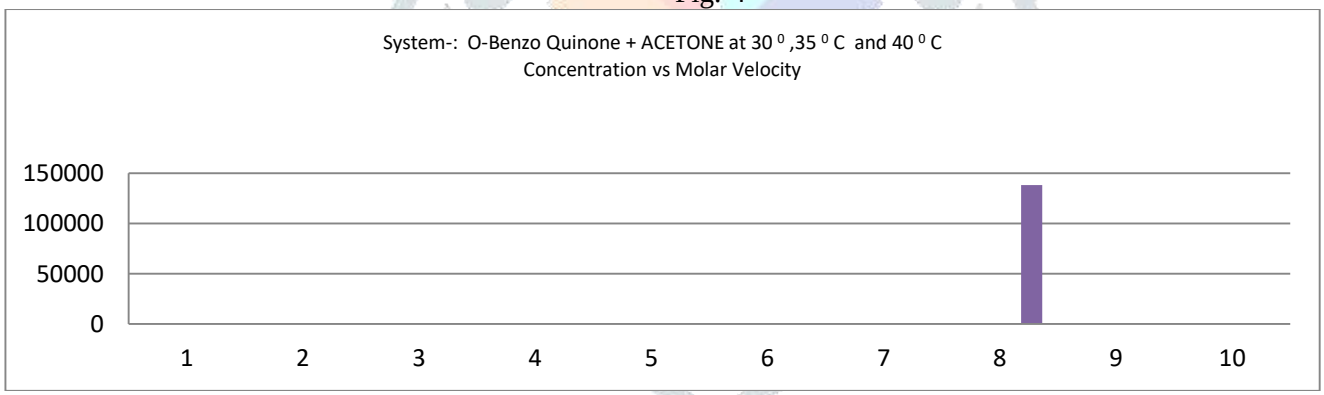

Fig.-5

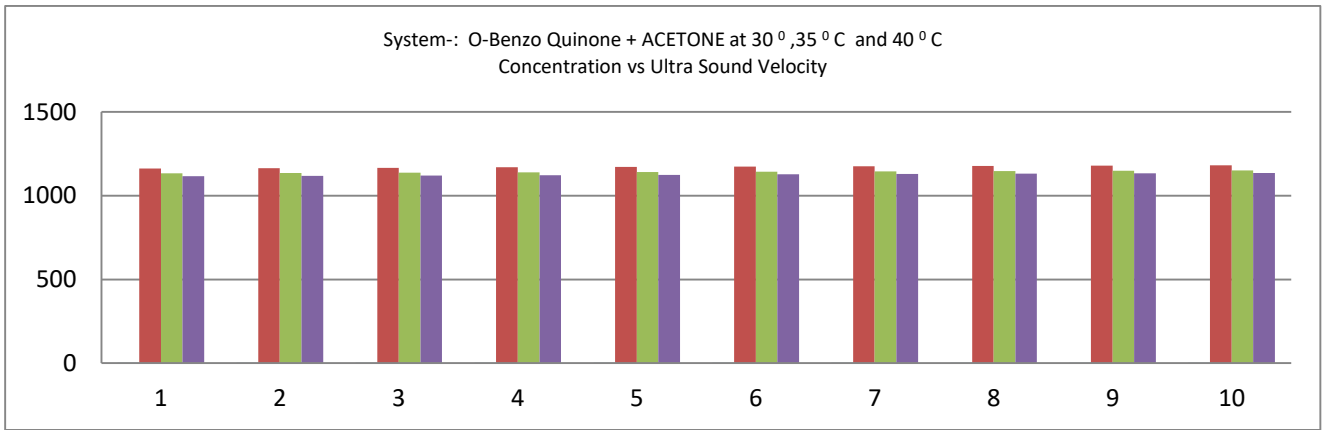

Fig.-6

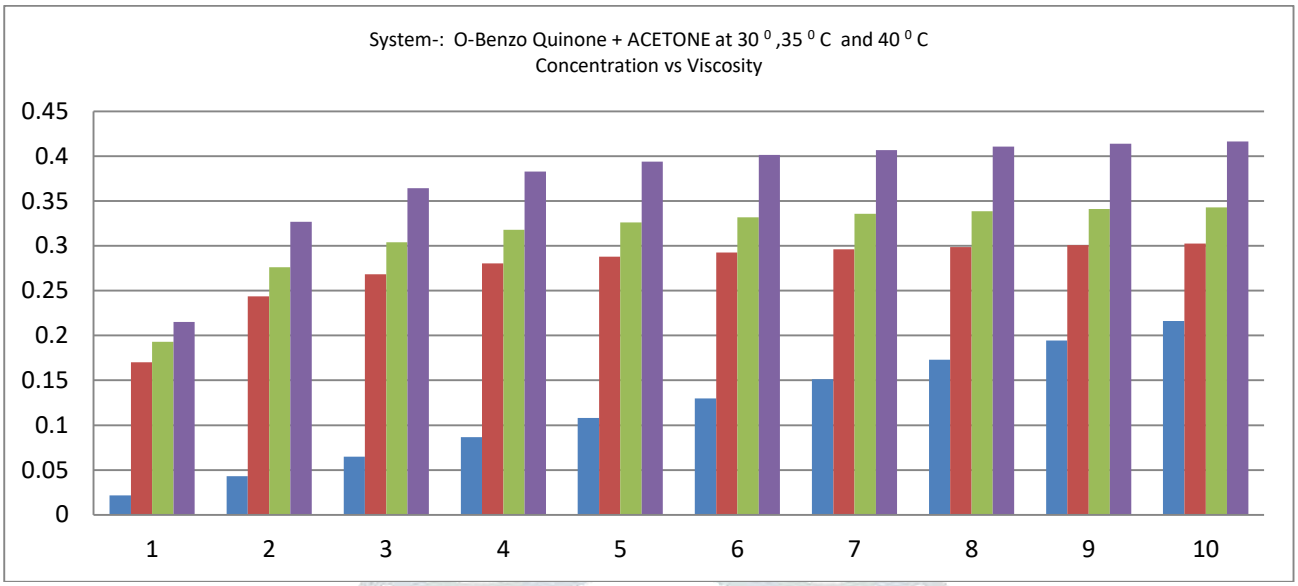

Fig.-7

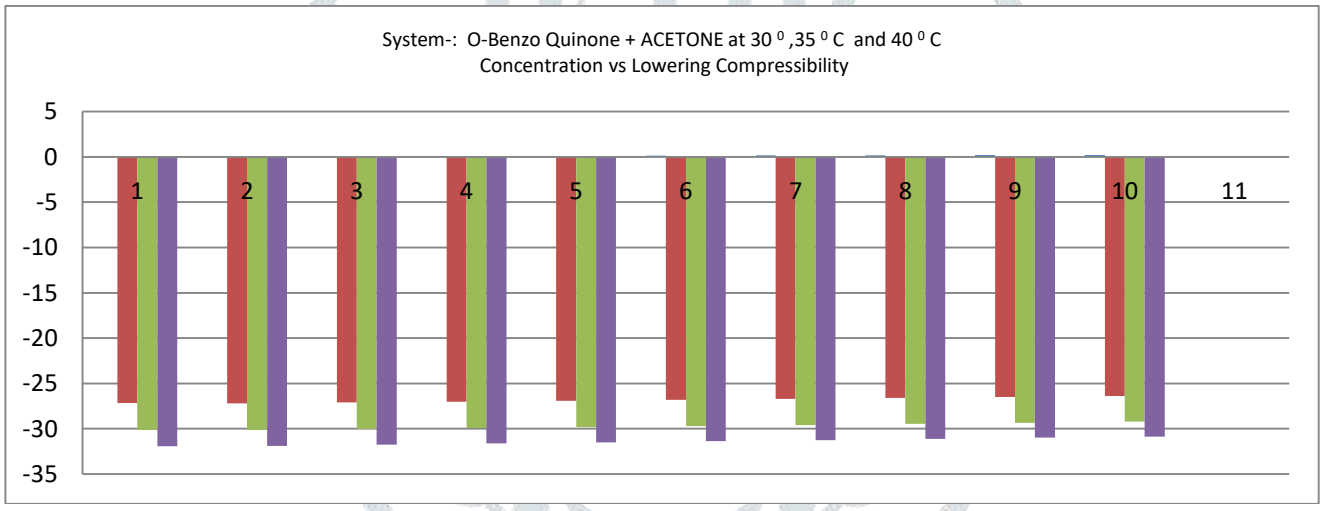

Fig.-8

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