

SUPPORTING INFORMATION

SURFACE TENSION, VISCOSITY AND REFRACTIVE INDEX OF SODIUM DODECYL SULFATE (SDS) IN AQUEOUS SOLUTION CONTAINING POLYETHYLENE GLYCOL (PEG), POLYVINYL PYRROLIDONE (PVP) AND THEIR BLENDS

Ram Singh¹, Suvarcha Chauhan¹, Kundan Sharma^{*2}

¹Department of Chemistry, H. P. University, Shimla–171005, India

²Department of Chemistry, Govt. Degree College Paonta Sahib affiliated to Himachal Pradesh University, Shimla (H.P.) – 173 025, India

***Corresponding author:** Dr. Kundan Sharma (Assistant Professor)

Department of Chemistry, Govt. Degree College Paonta Sahib affiliated to Himachal Pradesh University, Shimla (H.P.) – 173 025, India

Phone: +91-94182 11568, Email: kundanvashisht@gmail.com

Table S1. Calculated values of relative viscosity η_r for SDS in the solvent (water + polymer) as a function of temperature T , at pressure $p = 100$ kPa.^a

T/K	$10^3 \times$ $[SDS]$ $/\text{mol}\cdot\text{kg}^{-1}$	η_r					
		m_1	m_2	m_3	m_4	m_5	m_6
293.15	0.001	1.0301	1.0054	1.0053	1.0157	1.0111	1.0078
	0.002	1.0335	1.0093	1.0095	1.0189	1.0168	1.0100
	0.003	1.0365	1.0128	1.0120	1.0245	1.0201	1.0145
	0.004	1.0392	1.0155	1.0177	1.0266	1.0240	1.0164
	0.005	1.0453	1.0183	1.0212	1.0330	1.0263	1.0201
	0.006	1.0468	1.0214	1.0261	1.0387	1.0307	1.0222
	0.007	1.0552	1.0264	1.0333	1.0451	1.0351	1.0252
	0.008	1.0562	1.0343	1.0385	1.0510	1.0398	1.0286
	0.009	1.0625	1.0388	1.0419	1.0561	1.0434	1.0302
	0.010	1.0636	1.0429	1.0446	1.0633	1.0500	1.0352
	0.012	1.0673	1.0481	1.0542	1.0712	1.0549	1.0436
	0.014	1.0689	1.0543	1.0549	1.0772	1.0666	1.0506
	0.016	1.0754	1.0611	1.0592	1.0833	1.0765	1.0576
303.15	0.001	1.0365	1.0122	1.0131	1.0217	1.0181	1.0135
	0.002	1.0400	1.0150	1.0180	1.0258	1.0234	1.0171
	0.003	1.0418	1.0205	1.0216	1.0320	1.0251	1.0183
	0.004	1.0475	1.0234	1.0252	1.0378	1.0289	1.0211
	0.005	1.0513	1.0277	1.0312	1.0427	1.0335	1.0243
	0.006	1.0590	1.0308	1.0362	1.0470	1.0359	1.0279
	0.007	1.0619	1.0341	1.0432	1.0545	1.0428	1.0341
	0.008	1.0656	1.0389	1.0476	1.0629	1.0472	1.0387
	0.009	1.0673	1.0453	1.0543	1.0692	1.0509	1.0422
	0.010	1.0701	1.0494	1.0579	1.0763	1.0572	1.0462
	0.012	1.0723	1.0539	1.0636	1.0886	1.0639	1.0556
	0.014	1.0781	1.0625	1.0656	1.0980	1.0756	1.0603
	0.016	1.0842	1.0679	1.0694	1.1055	1.0822	1.0680

313.15	0.001	1.0469	1.0181	1.0251	1.0301	1.0290	1.0202
	0.002	1.0518	1.0200	1.0287	1.0382	1.0345	1.0235
	0.003	1.0555	1.0266	1.0335	1.0440	1.0377	1.0254
	0.004	1.0603	1.0289	1.0384	1.0494	1.0413	1.0276
	0.005	1.0656	1.0319	1.0431	1.0518	1.0469	1.0321
	0.006	1.0703	1.0371	1.0525	1.0605	1.0492	1.0382
	0.007	1.0737	1.0393	1.0598	1.0694	1.0549	1.0410
	0.008	1.0753	1.0447	1.0645	1.0742	1.0590	1.0453
	0.009	1.0770	1.0498	1.0698	1.0815	1.0637	1.0495
	0.010	1.0806	1.0533	1.0741	1.0865	1.0673	1.0547
	0.012	1.0824	1.0597	1.0789	1.0997	1.0800	1.0619
	0.014	1.0879	1.0678	1.0839	1.1087	1.0928	1.0683
	0.016	1.0934	1.0727	1.0885	1.1186	1.1015	1.0750

$m_1 = 0.00166 \text{ mol}\cdot\text{kg}^{-1}$, $m_2 = 0.00138 \text{ mol}\cdot\text{kg}^{-1}$, $m_3 = 0.00110 \text{ mol}\cdot\text{kg}^{-1}$, $m_4 = 0.00081 \text{ mol}\cdot\text{kg}^{-1}$, $m_5 = 0.00053 \text{ mol}\cdot\text{kg}^{-1}$, $m_6 = 0.00025 \text{ mol}\cdot\text{kg}^{-1}$. Here, molality corresponds to the total polymer content in the solution.

^aStandard uncertainties are $u(T) = 0.05 \text{ K}$, $u(p) = 10 \text{ kPa}$, $u(m_{\text{polymer}}) = 2 \times 10^{-4} \text{ mol}\cdot\text{kg}^{-1}$, $u(m_{\text{SDS}}) = 1 \times 10^{-4} \text{ mol}\cdot\text{kg}^{-1}$.

Expanded uncertainties for η_r is $U(\eta_r) = 0.01$ (0.95 level of confidence).

Table S2. Calculated values of viscous relaxation time τ for SDS in the solvent (water + polymer) as a function of temperature T , at pressure $p = 100 \text{ kPa}$.^a

T/K	$10^3 \times [\text{SDS}]$ $/\text{mol}\cdot\text{kg}^{-1}$	τ / ps					
		m_1	m_2	m_3	m_4	m_5	m_6
293.15	0.001	0.731	0.724	0.733	0.750	0.751	0.760
	0.002	0.733	0.727	0.736	0.752	0.755	0.761
	0.003	0.735	0.729	0.738	0.756	0.757	0.764
	0.004	0.737	0.731	0.742	0.757	0.760	0.766
	0.005	0.741	0.732	0.744	0.762	0.762	0.768
	0.006	0.742	0.734	0.748	0.766	0.765	0.770
	0.007	0.748	0.738	0.753	0.771	0.768	0.772
	0.008	0.749	0.743	0.757	0.775	0.772	0.775
	0.009	0.753	0.747	0.759	0.779	0.774	0.776
	0.010	0.754	0.750	0.761	0.784	0.779	0.780

	0.012	0.757	0.753	0.768	0.790	0.783	0.786
	0.014	0.758	0.758	0.768	0.794	0.791	0.791
	0.016	0.763	0.763	0.771	0.798	0.799	0.796
	0.001	0.560	0.553	0.563	0.582	0.588	0.598
	0.002	0.561	0.554	0.566	0.584	0.591	0.600
	0.003	0.562	0.557	0.567	0.587	0.592	0.601
	0.004	0.565	0.559	0.569	0.591	0.594	0.602
	0.005	0.567	0.561	0.573	0.593	0.596	0.604
	0.006	0.571	0.562	0.575	0.596	0.598	0.606
	0.007	0.573	0.564	0.579	0.600	0.602	0.610
	0.008	0.575	0.567	0.582	0.605	0.604	0.613
303.15	0.009	0.576	0.570	0.585	0.608	0.606	0.615
	0.010	0.577	0.573	0.587	0.612	0.610	0.617
	0.012	0.578	0.575	0.590	0.619	0.614	0.622
	0.014	0.582	0.580	0.592	0.625	0.621	0.625
	0.016	0.585	0.583	0.594	0.629	0.624	0.630
	0.001	0.448	0.446	0.462	0.476	0.484	0.484
	0.002	0.450	0.447	0.463	0.480	0.486	0.485
	0.003	0.452	0.450	0.466	0.482	0.488	0.486
	0.004	0.454	0.451	0.468	0.485	0.489	0.487
	0.005	0.456	0.452	0.470	0.486	0.492	0.489
	0.006	0.458	0.454	0.474	0.490	0.493	0.492
303.15	0.007	0.460	0.455	0.477	0.494	0.496	0.493
	0.008	0.460	0.457	0.479	0.496	0.498	0.495
	0.009	0.461	0.460	0.482	0.499	0.500	0.497
	0.010	0.462	0.461	0.484	0.502	0.502	0.500
	0.012	0.463	0.464	0.486	0.508	0.508	0.503
	0.014	0.466	0.468	0.488	0.512	0.514	0.506
	0.016	0.468	0.470	0.490	0.516	0.518	0.509

$m_1 = 0.00166 \text{ mol}\cdot\text{kg}^{-1}$, $m_2 = 0.00138 \text{ mol}\cdot\text{kg}^{-1}$, $m_3 = 0.00110 \text{ mol}\cdot\text{kg}^{-1}$, $m_4 = 0.00081 \text{ mol}\cdot\text{kg}^{-1}$, $m_5 = 0.00053 \text{ mol}\cdot\text{kg}^{-1}$, $m_6 = 0.00025 \text{ mol}\cdot\text{kg}^{-1}$. Here, molality corresponds to the total polymer content in the solution.

^aStandard uncertainties are $u(T) = 0.05 \text{ K}$, $u(p) = 10 \text{ kPa}$, $u(m_{\text{polymer}}) = 2 \times 10^{-4} \text{ mol}\cdot\text{kg}^{-1}$, $u(m_{\text{SDS}}) = 1 \times 10^{-4} \text{ mol}\cdot\text{kg}^{-1}$.

¹. Expanded uncertainties for τ is $U(\tau) = 0.001 \text{ ps}$ (0.95 level of confidence).

Table S3. Calculated values of limiting dielectric constant ϵ_∞ for SDS in the solvent (water + polymer) as a function of temperature, at pressure $p = 100 \text{ kPa}$.^a

T/K	$10^3 \times [SDS]/\text{mol}\cdot\text{kg}^{-1}$	ϵ_∞					
		m_1	m_2	m_3	m_4	m_5	m_6
293.15	0.001	1.780623	1.781424	1.781424	1.781958	1.781691	1.783026
	0.002	1.780890	1.781424	1.781691	1.782225	1.781691	1.783026
	0.003	1.780890	1.781691	1.781958	1.782225	1.782225	1.783026
	0.004	1.780890	1.781958	1.782225	1.782492	1.782225	1.783026
	0.005	1.781157	1.782225	1.782492	1.782492	1.782492	1.783293
	0.006	1.781157	1.782492	1.782759	1.782759	1.782492	1.783293
	0.007	1.781157	1.782759	1.783026	1.782759	1.782492	1.783293
	0.008	1.781424	1.783026	1.783026	1.782759	1.782759	1.783293
	0.009	1.781424	1.783293	1.783293	1.783026	1.782759	1.783293
	0.010	1.781424	1.783293	1.783293	1.783026	1.783026	1.783560
	0.012	1.781691	1.783293	1.783560	1.783293	1.783293	1.783560
	0.014	1.781958	1.783560	1.783560	1.783560	1.783560	1.783560
	0.016	1.781958	1.783560	1.783560	1.783560	1.783827	1.783827
303.15	0.001	1.779556	1.780356	1.780623	1.780890	1.780890	1.781958
	0.002	1.779556	1.780356	1.780623	1.780890	1.781157	1.781958
	0.003	1.779823	1.780356	1.780623	1.781157	1.781691	1.781958
	0.004	1.779823	1.780623	1.780890	1.781157	1.781691	1.782225
	0.005	1.779823	1.780623	1.780890	1.781424	1.781691	1.782225
	0.006	1.779823	1.780623	1.780890	1.781424	1.781958	1.782225

