

Supporting Information Available: Experimental solubility, optimized parameters for the models, and predicted values of the mixing properties in pure solvents and binary mixture solvents. This material is available free of charge via the Internet at <http://pubs.acs.org/>.

Table 1. Experimental Solubilities of Ginsenoside Compound K in Different Pure Solvents

T (K)	$10^3 x_1$	$\ln \gamma_1$	$10^2 (x_1 - x_1^{cal}) / x_1$				
			van't Hoff	λh	Apelblat	Wilson	NRTL
methanol							
278.15	2.727	5.099	8.943	7.668	-0.6821	-0.4417	2.173
283.15	3.033	5.032	1.655	0.875	-3.178	-2.039	-1.107
288.15	3.783	4.849	5.871	5.581	4.977	2.1461	3.251
293.15	4.206	4.780	-0.4705	-0.4182	1.127	0.3702	0.2793
298.15	4.665	4.712	-6.871	-6.573	-3.785	-1.554	-2.715
303.15	5.793	4.530	-0.9953	-0.6244	2.103	1.133	0.8117
308.15	6.577	4.436	-3.837	-3.519	-1.543	-0.2113	-0.8516
313.15	7.926	4.282	-0.09587	-0.0109	0.2566	0.2504	0.1719
318.15	9.418	4.140	2.613	2.312	0.1825	-0.2513	0.00477
	ARDP		3.484	3.065	1.982	0.9329	1.263
acetone							
278.15	0.4351	4.609	-0.7596	-1.297	1.280	-1.152	-0.7819
283.15	0.5160	4.583	-1.162	-1.206	0.02717	-0.6439	-1.053
288.15	0.6134	4.549	-0.7086	-0.3533	-0.1436	-2.530	-0.4912
293.15	0.7233	4.519	-0.4933	0.1406	-0.3442	-0.6922	-0.1849
298.15	0.8332	4.507	-2.057	-1.293	-2.1697	0.08111	-1.6886
303.15	0.9822	4.468	-0.8185	0.00442	-0.9286	-0.3640	-0.3867
308.15	1.199	4.391	4.476	4.976	4.318	-2.681	4.699
313.15	1.290	4.434	-2.448	-2.015	-2.165	1.328	-2.0531
318.15	1.508	4.393	-0.7060	-0.6191	0.08039	0.2129	-0.2663
	ARDP		1.514	1.323	1.273	1.076	1.283
acetonitrile							
278.15	0.02443	9.815	-2.228	-2.094	-0.9891	0.5403	-0.7091
283.15	0.02926	9.673	-2.544	-2.468	-1.997	0.2678	-1.164
288.15	0.03539	9.521	-1.269	-1.239	-1.236	0.8504	-0.0539
293.15	0.04328	9.357	1.699	1.695	1.405	2.286	2.663
298.15	0.05199	9.209	3.409	3.384	2.950	2.857	4.098
303.15	0.05977	9.104	1.378	1.344	0.8846	1.263	1.769
308.15	0.06745	9.016	-2.053	-2.083	-2.448	-1.101	-2.012
313.15	0.07876	8.893	-1.547	-1.557	-1.692	-1.375	-1.929
318.15	0.09332	8.755	0.8796	0.9032	1.099	-0.7296	0.05718
	ARDP		1.890	1.863	1.633	1.252	1.604

Table 2. Model Parameters in Different Solvents

solvent	van't Hoff		λh		Apelblat			Wilson		NRTL		
	ΔH_{soln}	ΔS_{soln}	λ	h	A	B	C	$\Delta\lambda_{12}$	$\Delta\lambda_{21}$	α_{12}	Δg_{12}	Δg_{21}
methanol	24035.21	93.97	0.08329	32583.76	-254.89	9070.05	39.67	5198.10	9952.08	0.30	-2804.48	16602.93
acetone	22849.16	75.29	0.01523	170032.66	52.13	-4684.40	-6.42	3933.83	22198.60	0.18	26615.91	7299.03
acetonitrile	24088.04	55.92	1.10	2646.02	41.31	-4451.12	-5.15	16047.37	25216.12	0.15	10646.45	17346.19

Table 3. Predicated Values for ΔG , ΔH , ΔS , $\ln \gamma_1^\infty$ and $H_1^{E,\infty}$

T(K)	ΔG (J·mol ⁻¹)	ΔH (J·mol ⁻¹)	ΔS (J·mol ⁻¹ ·K ⁻¹)	$\ln \gamma_1^\infty$	$H_1^{E,\infty}$ (J·mol ⁻¹)
methanol					
278.15	-9.83	15.36	0.091	5.63	6932.26
283.15	-10.88	17.30	0.099	5.58	7069.18
288.15	-12.74	21.38	0.12	5.52	7211.58
293.15	-14.07	24.07	0.13	5.47	7359.41
298.15	-15.51	27.05	0.14	5.42	7512.59
303.15	-18.08	33.25	0.17	5.37	7671.03
308.15	-20.17	38.06	0.19	5.32	7834.65
313.15	-23.16	45.63	0.22	5.27	8003.35
318.15	-26.43	54.12	0.25	5.22	8177.02
acetone					
278.15	-4.10	1.69	0.021	4.68	3953.23
283.15	-4.79	1.99	0.024	4.65	3956.81
288.15	-5.58	2.37	0.028	4.62	3960.90
293.15	-6.46	2.79	0.032	4.59	3965.53
298.15	-7.34	3.20	0.035	4.56	3970.76
303.15	-8.47	3.76	0.040	4.54	3976.64
308.15	-9.99	4.57	0.047	4.51	3983.22
313.15	-10.77	4.91	0.050	4.49	3990.55
318.15	-12.28	5.71	0.057	4.46	3998.68
acetonitrile					
278.15	-0.090	0.31	0.0015	10.25	16053.35
283.15	-0.11	0.37	0.0017	10.13	16054.62
288.15	-0.13	0.44	0.0020	10.01	16056.10
293.15	-0.15	0.53	0.0023	9.89	16057.81
298.15	-0.18	0.62	0.0027	9.78	16059.79
303.15	-0.20	0.71	0.0030	9.68	16062.06
308.15	-0.23	0.80	0.0033	9.57	16064.65
313.15	-0.27	0.92	0.0038	9.47	16067.59
318.15	-0.31	1.07	0.0043	9.38	16070.91

Table 4. Experimental Solubilities of Ginsenoside Compound K in Different Binary Mixture

Solvents										
Water / mole fraction	$10^3 x_1$					$10^2 (x_1 - x_1^{cal}) / x_1$				
	T / K									
	methanol + water mixture									
	278.15	288.15	298.15	308.15	318.15	278.15	288.15	298.15	308.15	318.15
0	2.727	3.78	4.665	6.577	9.418	32.85	24.04	14.17	3.417	-8.429
0.08559	1.223	1.885	3.318	5.295	7.435	32.08	24.40	16.15	6.497	-1.691
0.1650	0.9741	1.261	1.510	2.502	4.241	31.68	23.62	14.58	6.539	-9.375
0.3078	0.3026	0.4026	0.5247	1.008	1.832	14.37	7.188	-1.14	-0.08956	-3.731
0.4325	0.1559	0.2416	0.3137	0.5278	0.8819	-12.25	-11.30	-18.93	-15.57	-14.99
0.5425	0.1274	0.15789	0.2227	0.3841	0.5839	-25.66	-36.81	-38.48	-28.84	-28.03
0.6400	0.09481	0.1397	0.1617	0.2801	0.4514	-50.98	-48.50	-65.04	-48.58	-40.73
	overall ARDP									21.73
	acetone + water mixture									
	278.15	288.15	298.15	308.15	318.15	278.15	288.15	298.15	308.15	318.15
0	0.4351	0.6534	0.8332	1.099	1.508	42.33	38.62	15.39	-10.37	-40.11
0.1698	0.5733	1.395	1.884	2.169	2.897	36.30	44.40	25.58	0.2884	-28.35
0.287	0.6804	2.057	3.288	3.985	4.761	20.03	46.73	30.02	7.275	-20.67
0.4463	1.031	2.379	3.663	5.465	7.188	35.77	22.90	26.69	12.84	-11.22
0.6168	0.5924	1.550	2.550	4.196	5.663	36.21	46.28	32.06	15.57	-6.217
0.7632	0.1814	0.4014	0.8061	1.106	1.614	13.21	22.96	16.46	-4.08	-24.61
0.8291	0.1047	0.1052	0.2052	0.2796	0.4316	-4.825	-57.42	-50.63	-62.94	-28.42
	overall ARDP									26.79
	acetonitrile + water mixture									
	278.15	288.15	298.15	308.15	318.15	278.15	288.15	298.15	308.15	318.15
0	0.03242	0.03839	0.0520	0.06541	0.09231	-19.20	-40.67	-52.82	-55.41	-67.85
0.202	0.2516	0.3398	0.4044	0.5289	0.9182	26.13	16.82	5.791	-5.383	-15.28
0.2868	0.5751	0.6179	0.6686	0.8204	1.032	29.23	19.36	8.429	-2.876	-14.92
0.3629	0.8165	0.8820	0.9559	1.182	1.313	30.08	20.53	10.00	-0.916	-13.36
0.4942	0.9762	1.054	1.141	1.392	1.839	30.77	21.45	11.21	0.6291	-4.619
0.6030	1.063	1.104	1.352	1.883	2.288	31.64	22.44	13.10	3.710	-29.21
0.6951	0.5737	0.6290	0.6841	0.7629	0.9037	29.88	20.39	9.902	-1.278	-12.53
	overall ARDP									19.94

Table 5. Wilson Model Parameters in Binary Mixture Solvents

solvents	$\Delta\lambda_{12}$	$\Delta\lambda_{21}$	$\Delta\lambda_{13}$	$\Delta\lambda_{31}$	$\Delta\lambda_{23}$	$\Delta\lambda_{32}$
methanol + water	21449.99	15804.24	12136.39	8226.35	-14297.09	-2038.84
acetone + water	10374.12	18541.18	11529.67	3053.60	-15548.04	3513.39
acetonitrile + water	16311.93	19134.79	16399.59	7443.59	-16719.91	2908.08

Table 6. Predicated Values for $\ln \gamma_1$ and ΔG_1

Water / mole fraction	$\ln \gamma_1$					ΔG_1				
	T / K									
	methanol + water mixture									
	278.15	288.15	298.15	308.15	318.15	278.15	288.15	298.15	308.15	318.15
0	5.53	5.15	4.89	4.50	4.09	-2.38	-3.84	-5.47	-8.83	-14.36
0.08559	6.32	5.86	5.26	4.75	4.39	-1.10	-1.89	-3.70	-6.67	-10.32
0.1650	6.54	6.25	6.03	5.50	4.88	-0.89	-1.29	-1.77	-3.145	-6.21
0.3078	7.48	7.19	6.92	6.34	5.77	-0.43	-0.60	-0.83	-1.44	-2.58
0.4325	7.88	7.52	7.30	6.84	6.40	-0.32	-0.47	-0.62	-0.95	-1.48
0.5425	7.96	7.74	7.46	7.05	6.70	-0.30	-0.38	-0.53	-0.80	-1.15
0.6400	8.08	7.78	7.60	7.23	6.87	-0.26	-0.37	-0.45	-0.69	-1.00
	acetone + water mixture									
	278.15	288.15	298.15	308.15	318.15	278.15	288.15	298.15	308.15	318.15
0	5.34	4.99	4.65	4.28	3.99	-2.41	-3.54	-5.04	-7.52	-9.99
0.1698	4.86	4.39	4.03	3.81	3.47	-4.40	-7.32	-10.48	-12.93	-18.21
0.287	4.50	4.06	3.56	3.29	3.05	-6.66	-10.48	-17.59	-22.76	-28.93
0.4463	4.46	3.94	3.48	3.05	2.73	-6.91	-11.97	-19.32	-30.2	-41.91
0.6168	4.81	4.30	3.82	3.34	3.01	-4.56	-8.04	-13.58	-22.97	-32.39
0.7632	5.62	5.19	4.70	4.40	4.06	-1.34	-2.53	-4.85	-6.83	-10.12
0.8291	6.00	5.70	5.37	5.13	4.84	-0.48	-0.87	-1.59	-2.19	-3.32
	acetonitrile + water mixture									
	278.15	288.15	298.15	308.15	318.15	278.15	288.15	298.15	308.15	318.15
0	9.39	9.13	8.81	8.54	8.21	-0.071	-0.096	-0.14	-0.18	-0.26
0.202	7.81	7.25	7.25	6.93	6.36	-0.27	-0.42	-0.57	-0.83	-1.55
0.2868	7.03	6.91	6.77	6.52	6.24	-0.57	-0.71	-0.89	-1.23	-1.73
0.3629	6.69	6.57	6.43	6.17	6.01	-0.79	-0.99	-1.23	-1.72	-2.16
0.4942	6.52	6.40	6.27	6.03	5.76	-0.92	-1.15	-1.43	-1.97	-2.74
0.6030	6.36	4.77	6.12	5.75	5.33	-0.97	-1.17	-1.63	-2.51	-4.09
0.6951	6.90	5.14	6.77	6.61	6.40	-0.56	-0.71	-0.88	-1.12	-1.47