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Phase equilibrium in the ternary system water–ethylene glycol–dimethyl sulfoxide

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Experimental details

Table S1. Physicochemical characteristics of the compounds studied at 298 K.[S1]

Parameter	M	μ, D	DN_{SbCl_5}	M.p., °C	B.p., °C	$\rho^{(298K)}$, $kg/m^3 \cdot 10^3$	$\eta^{(298K)}$, $Pa \cdot s \cdot 10^{-3}$	$D \cdot 10^5$, cm^2/s
H_2O	18	1.83	18	0	100	0.99707	0.8903	2.25
EG	62	2.88	18.5	-12.9	197	1.113	16.16	0.083
DMSO	78	3.96	29.8	18.5	189	1.0955	2.194	0.72

Table S2. Temperatures of phase transitions (K) and enthalpy variation (J/kg) in the H_2O-EG-DMSO system.

mol.%	Tcr	ΔHcr, J/g	M.p.	ΔHmelt, J/g
H_2O-EG, (mol% EG)				
10.74	245	-97	258	96
H_2O-EG-DMSO, (mol% DMSO)				
13.86	liq.	liq.	liq.	liq.
18.3	liq.	liq.	liq.	liq.
31.62	liq.	liq.	liq.	liq.
41.27	liq.	liq.	226	2
50.7	226	-39	244	37
61.28	242	-59	260	56
69.85	257	-82	272	82
79.3	261	-103	278	92
89.84	269	-111	283	104
H_2O-EG, (mol% EG)				

19.69	205	-31	237	29
H_2O-EG-DMSO, (mol% DMSO)				
10.93	liq.	liq.	liq.	liq.
20.33	liq.	liq.	liq.	liq.
29.32	liq.	liq.	liq.	liq.
39.41	liq.	liq.	liq.	liq.
49.8	212	-38	242	35
61.2	241	-64	262	55
71.08	254	-82	272	79
80.16	265	-102	279	100
90.31	274	-129	286	124
H_2O-EG, (mol% EG)				
29.61	liq.	liq.	liq.	liq.
H_2O-EG-DMSO, (mol% DMSO)				
10.74	liq.	liq.	liq.	liq.
18.37	liq.	liq.	liq.	liq.
29.96	liq.	liq.	liq.	liq.
41.23	liq.	liq.	liq.	liq.
52.08	217	-42	246	33
62.26	234	-55	261	50
68.64	248	-66	264	77
83.15	268	-115	280	115
90.05	270	-120	283	109
H_2O-EG, (mol% EG)				
39.55	liq.	liq.	liq.	liq.
H_2O-EG-DMSO, (mol% DMSO)				
11.57	liq.	liq.	liq.	liq.
18.65	liq.	liq.	liq.	liq.
31.14	liq.	liq.	liq.	liq.
38.61	liq.	liq.	liq.	liq.
49.24	203	-38	238	32
58.87	230	-47	253	41
69.6	247	-65	268	51
79.5	266	-86	276	81
90.09	267	-97	279	90
H_2O-EG, (mol% EG)				

49.63	liq.	liq.	liq.	liq.
H_2O-EG-DMSO, (mol% DMSO)				
9.88	liq.	liq.	liq.	liq.
22.75	liq.	liq.	liq.	liq.
32.54	liq.	liq.	liq.	liq.
40.36	liq.	liq.	liq.	liq.
50.81	205	-24	240	36
60.34	231	-51	253	45
72.49	249	-43	265	60
79.69	259	-85	274	86
89.39	262	-94	278	92
H_2O-EG, (mol% EG)				
60.02	liq.	liq.	liq.	liq.
H_2O-EG-DMSO, (mol% DMSO)				
9.34	liq.	liq.	liq.	liq.
20.1	liq.	liq.	liq.	liq.
29.12	liq.	liq.	liq.	liq.
40.05	liq.	liq.	liq.	liq.
48.85	211	-20	232	17
58.28	216	-51	251	42
69.1	245	-68	265	59
79.29	258	-89	274	94
90.05	269	-118	283	112
H_2O-EG, (mol% EG)				
69.91	221^{Tcr1} 216^{Tcr2}	$-77^{\sum\Delta Hcr}$	230^{Mp1} 242^{Mp2}	$75^{\sum\Delta Hmelt}$
H_2O-EG-DMSO, (mol% DMSO)				
9.56	liq.	liq.	liq.	liq.
17.2	liq.	liq.	liq.	liq.
27.79	liq.	liq.	liq.	liq.
36.27	liq.	liq.	liq.	liq.
47.98	212	-19	232	13
59.26	215	-50	252	48
69.27	243	-62	265	65
79.56	260	-89	277	85
89.56	271	-115	285	131
H_2O-EG, (mol% EG)				

79.87	205	-108	251	112
H_2O-EG-DMSO, (mol% DMSO)				
9.85	232	-32	245	28
17.47	liq.	liq.	liq.	liq.
28.86	liq.	liq.	liq.	liq.
39.54	liq.	liq.	liq.	liq.
49.69	220	-7	235	9
58.18	210	-53	249	47
68.46	241	-63	269	57
82.37	248	-73	268	51
92.61	274	-131	285	125
H_2O-EG, (mol% EG)				
89.83	228	-139	210 ^{Mp1} 258 ^{Mp2}	12 $^{\Delta Hmelt1}$ 144 $^{\Delta Hmelt2}$
H_2O-EG-DMSO, (mol% DMSO)				
9.77	231 ^{Tcr1} 222 ^{Tcr2}	-99 $^{\sum\Delta Hcr}$	237 ^{Mp1} 251 ^{Mp2}	90 $^{\sum\Delta Hmelt}$
19.53	liq.	liq.	liq.	liq.
28.95	liq.	liq.	liq.	liq.
39.08	liq.	liq.	liq.	liq.
49.94	220	-7	236	7
59.09	210 ^{Tcr1} 204 ^{Tcr2}	-47 $^{\sum\Delta Hcr}$	237 ^{Mp1} 251 ^{Mp2}	41 $^{\sum\Delta Hmelt}$
69.84	244	-63	266	66
78.06	256	-85	272	75
89.22	269	-119	284	127

‘liq.’ - no crystallization/melting of the sample on cooling to 188 K and heating to 298 K.

References

S1 E. G. Kononova, M. N. Rodnikova, I. A. Solonina and E. V. Shirokova, *Russ. J. Phys. Chem. A*, 2020, **94**, 2233 (*Zh. Fiz. Khim.*, 2020, **94**, 1624).