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The Use of Rotating Cylinder Electrode to Study the Effect of 1,3 Dihydroxypropane on the Production of Copper Powder

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Table S1. Viscosities and densities for all solutions at different temperatures

	Temperature, T (K)	Viscosity, η (poise)	Density, 4 (g cm^{-3})
Blank, 0% (v/v) DHP	298	0.01084	1.09928
	303	0.00972	1.09647
	308	0.00879	1.09365
	313	0.00800	1.09084
10% (v/v) DHP	298	0.01129	1.10656
	303	0.01013	1.10373
	308	0.00915	1.10090
	313	0.00833	1.09807
20% (v/v) DHP	298	0.01304	1.11484
	303	0.01169	1.11199
	308	0.01056	1.10913
	313	0.00961	1.10628
30% (v/v) DHP	298	0.01543	1.12810
	303	0.01384	1.12522
	308	0.01250	1.12233
	313	0.01138	1.11945
40% (v/v) DHP	298	0.01879	1.13638
	303	0.01685	1.13348
	308	0.01523	1.13057
	313	0.01386	1.12766
50% (v/v) DHP	298	0.02334	1.14865
	303	0.02093	1.14571
	308	0.01892	1.14277
	313	0.01721	1.13984
60% (v/v) DHP	298	0.02964	1.15793
	303	0.02658	1.15497
	308	0.02402	1.15200
	313	0.02186	1.14904

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Table S2. Values of the limiting current density, I_l / (mA cm^{-2}), for all solutions at different temperatures and different speeds of rotation

	rpm	298 K	303 K	308 K	313 K		rpm	298 K	303 K	308 K	313 K
Blank, 0% (v/v) DHP	0	9.70	10.80	11.76	12.93	30% (v/v) DHP (cont.)					
	100	18.51	26.01	30.82	33.78		600	16.50	19.12	22.15	26.49
	200	25.41	35.73	37.01	54.00		700	18.33	21.05	23.94	27.58
	300	35.88	45.52	55.40	66.77		800	19.36	23.39	26.28	30.66
	400	41.89	53.51	61.62	74.48		900	20.77	24.22	27.66	32.70
	500	48.51	60.88	64.67	84.45		1000	22.08	26.35	29.42	34.59
	600	54.12	71.92	80.61	99.41	40% (v/v) DHP	0	2.56	2.59	2.80	3.12
	700	58.63	73.78	96.56	109.97		100	3.89	5.75	6.20	6.73
	800	65.92	82.96	98.05	118.30		200	7.11	7.64	9.18	10.51
	900	71.07	87.87	111.13	125.64		300	8.62	9.39	10.79	12.62
	1000	74.27	96.34	112.74	135.79		400	10.93	12.27	12.93	14.58
10% (v/v) DHP	0	6.32	6.92	7.27	7.99		500	11.74	12.79	14.44	17.14
	100	9.93	11.95	13.16	15.50		600	12.27	14.33	16.05	18.71
	200	15.68	18.12	19.36	22.29		700	13.91	15.80	17.45	20.78
	300	18.69	21.98	24.90	27.97		800	14.61	17.00	20.50	23.83
	400	22.57	26.97	29.52	34.48		900	16.09	18.26	22.67	25.62
	500	25.34	30.97	34.52	39.06		1000	16.44	18.78	23.65	27.68
	600	28.55	33.69	37.68	43.23	50% (v/v) DHP	0	1.65	1.72	1.84	2.13
	700	30.86	36.89	41.71	46.43		100	3.68	4.17	4.91	5.74
	800	32.57	40.58	45.16	51.26		200	5.47	5.50	7.51	8.34
	900	35.68	43.16	48.57	55.08		300	6.73	7.67	9.60	10.29
	1000	38.02	46.05	51.33	59.76		400	7.32	8.06	10.50	11.59
20% (v/v) DHP	0	4.82	5.08	5.75	6.09		500	8.20	8.76	10.54	11.87
	100	8.13	8.89	10.13	11.03		600	8.59	9.81	12.27	14.91
	200	13.94	14.44	15.65	16.79		700	8.90	10.76	13.64	17.22
	300	15.31	16.48	18.59	21.17		800	10.13	11.63	15.27	20.03
	400	18.72	19.26	22.07	25.11		900	10.51	12.72	16.42	20.93
	500	21.20	24.34	26.55	29.46		1000	11.35	13.46	16.46	23.89
	600	23.77	26.18	29.12	32.27	60% (v/v) DHP	0	1.23	1.23	1.30	1.40
	700	25.21	29.59	32.00	36.91		100	2.35	2.56	2.78	2.80
	800	27.38	30.53	34.27	40.39		200	3.45	3.65	3.72	3.83
	900	28.45	33.07	37.58	47.38		300	4.23	4.35	5.53	5.77
	1000	30.33	34.54	39.49	47.71		400	5.27	5.43	6.24	6.86
30% (v/v) DHP	0	3.76	3.89	4.10	4.49		500	5.97	6.17	6.93	8.67
	100	6.13	6.27	6.48	8.17		600	6.21	6.62	8.15	11.19
	200	8.85	9.85	12.26	13.63		700	6.21	8.39	10.17	11.77
	300	10.44	13.64	13.85	16.61		800	7.11	8.53	10.54	12.35
	400	12.68	16.40	17.05	19.38		900	7.18	9.55	12.62	14.13
	500	14.40	17.33	19.57	22.78		1000	7.76	11.40	13.44	14.84

Table S3. Values of the percentage of inhibition (P) for all solutions at different temperatures and different speeds of rotation

	rpm	298 K	303 K	308 K	313 K		rpm	298 K	303 K	308 K	313 K
10% (v/v) DHP	0	34.82	35.89	38.20	38.18	40% (v/v) DHP	0	73.62	75.99	76.16	75.87
	100	46.34	54.04	57.31	54.11		100	78.98	77.90	79.88	80.08
	200	38.29	49.29	47.70	58.73		200	72.00	78.62	75.19	80.53
	300	47.91	51.72	55.04	58.11		300	75.98	79.37	80.52	81.10
	400	46.12	49.59	52.09	53.71		400	73.90	77.08	79.01	80.43
	500	47.75	49.14	46.62	53.75		500	75.80	78.99	77.67	79.71
	600	47.24	53.16	53.25	56.51		600	77.34	80.07	80.09	81.18
	700	47.36	50.00	56.80	57.78		700	76.27	78.58	81.93	81.10
	800	50.59	51.09	53.94	56.67		800	77.83	79.51	79.09	79.86
	900	49.80	50.88	56.29	56.16		900	77.37	79.22	79.60	79.61
	1000	48.81	52.20	54.48	55.99		1000	77.87	80.50	79.02	79.61
20% (v/v) DHP	0	50.34	52.94	51.10	52.93	50% (v/v) DHP	0	83.01	84.10	84.35	83.53
	100	56.10	65.80	67.13	67.34		100	80.11	83.97	84.08	83.01
	200	45.13	59.58	57.72	68.92		200	78.48	84.60	79.72	84.56
	300	57.32	63.79	66.44	68.30		300	81.25	83.14	82.67	84.59
	400	55.30	64.01	64.18	66.29		400	82.52	84.94	82.96	84.45
	500	56.30	60.02	58.95	65.12		500	83.09	85.61	83.70	85.94
	600	56.07	63.60	63.87	67.54		600	84.13	86.36	84.78	85.01
	700	57.00	59.89	66.86	66.43		700	84.82	85.42	85.87	84.35
	800	58.46	63.20	65.05	65.86		800	84.64	85.98	84.43	83.07
	900	59.96	62.37	66.18	62.29		900	85.21	85.52	85.22	83.34
	1000	59.17	64.15	64.98	64.86		1000	84.71	86.03	85.40	82.41
30% (v/v) DHP	0	61.27	63.96	65.14	65.30	60% (v/v) DHP	0	87.34	88.63	88.95	89.18
	100	66.87	75.89	78.99	75.83		100	87.32	90.16	90.98	91.72
	200	65.16	72.43	66.87	74.76		200	86.44	89.78	89.95	92.91
	300	70.91	70.03	75.00	75.12		300	88.21	90.44	90.02	91.36
	400	69.74	69.36	72.33	73.98		400	87.42	89.86	89.87	90.79
	500	70.32	71.54	69.74	73.03		500	87.69	89.86	89.29	89.74
	600	69.51	73.42	72.52	73.35		600	88.53	90.80	89.88	88.74
	700	68.74	71.47	75.21	74.92		700	89.41	88.62	89.47	89.30
	800	70.63	71.81	73.20	74.08		800	89.21	89.72	89.25	89.56
	900	70.77	72.44	75.11	73.98		900	89.89	89.13	88.64	88.76
	1000	70.27	72.65	73.91	74.53		1000	89.55	88.17	88.08	89.07

Table S4. Values of the equilibrium constant of adsorption (K_e) of DHP on copper at different temperatures and different speeds of rotation

rpm	298 K	303 K	308 K	313 K
0	0.27	0.29	0.30	0.31
100	0.49	0.73	0.84	0.72
200	0.31	0.54	0.50	0.81
300	0.53	0.61	0.77	0.83
400	0.48	0.57	0.65	0.69
500	0.51	0.52	0.49	0.68
600	0.48	0.63	0.66	0.83
700	0.47	0.56	0.81	0.85
800	0.55	0.60	0.71	0.81
900	0.54	0.60	0.81	0.76
1000	0.52	0.66	0.75	0.80

Table S5. Values of free energy of adsorption (ΔG_{ads}) for DHP on copper at different temperatures and different speeds of rotation

Solution	rpm	- ΔG_{ads} (kJ mol^{-1})				Solution	rpm	- ΔG_{ads} (kJ mol^{-1})			
		298 K	303 K	308 K	313 K			298 K	303 K	308 K	313 K
Blank, 0 % (v/v) DHP	0	9.20	9.47	9.88	10.04	40 % (v/v) DHP		17.23	17.93	18.23	18.71
10 % (v/v) DHP		12.51	12.98	13.00	13.41	50 % (v/v) DHP		18.88	19.64	19.64	20.00
20 % (v/v) DHP		14.61	15.15	15.53	15.80	60 % (v/v) DHP		20.26	21.22	21.30	21.33
30 % (v/v) DHP		16.73	17.33	17.64	17.89	Blank, 0 % (v/v) DHP	600	10.49	10.94	11.82	12.11
40 % (v/v) DHP		18.67	19.19	19.55	19.71	10 % (v/v) DHP		13.17	13.69	14.69	14.88
50 % (v/v) DHP		19.98	20.62	21.05	21.45	20 % (v/v) DHP		15.43	16.02	16.77	17.00
60 % (v/v) DHP		10.39	11.34	11.87	11.73	30 % (v/v) DHP		17.08	17.70	18.54	18.70
Blank, 0 % (v/v) DHP	100	13.08	14.33	14.72	14.98	40 % (v/v) DHP		19.01	19.44	19.86	19.87
10 % (v/v) DHP		15.22	16.59	17.32	17.13	50 % (v/v) DHP		20.48	20.62	21.18	21.48
20 % (v/v) DHP		17.47	17.60	18.20	18.53	60 % (v/v) DHP		10.81	11.05	11.52	12.00
30 % (v/v) DHP		18.20	19.16	19.50	19.61	Blank, 0 % (v/v) DHP	700	13.32	14.04	14.48	14.81
40 % (v/v) DHP		19.98	21.03	21.62	22.22	10 % (v/v) DHP		15.65	16.06	16.50	16.89
50 % (v/v) DHP		9.57	10.86	10.88	12.22	20 % (v/v) DHP		17.30	17.84	18.07	18.49
60 % (v/v) DHP		11.99	13.66	13.69	15.17	30 % (v/v) DHP		18.97	19.56	19.57	19.62
Blank, 0 % (v/v) DHP	200	15.03	16.14	15.73	16.98	40 % (v/v) DHP		20.43	20.91	21.12	21.55
10 % (v/v) DHP		16.53	17.71	17.51	18.60	50 % (v/v) DHP		10.74	11.02	11.76	11.94
20 % (v/v) DHP		17.95	19.28	18.74	19.91	60 % (v/v) DHP		13.47	13.95	14.61	14.41
30 % (v/v) DHP		19.78	20.92	21.32	22.66	Blank, 0 % (v/v) DHP	800	15.67	16.14	16.76	16.87
40 % (v/v) DHP		10.55	11.11	11.64	12.15	10 % (v/v) DHP		17.24	17.80	18.15	18.45
50 % (v/v) DHP		13.20	14.11	14.64	15.10	20 % (v/v) DHP		19.08	19.47	19.73	19.67
60 % (v/v) DHP		15.69	15.84	16.74	17.03	30 % (v/v) DHP		20.61	20.75	20.97	21.34
Blank, 0 % (v/v) DHP	300	17.04	17.82	18.30	18.70	40 % (v/v) DHP		10.64	11.16	11.58	11.92
10 % (v/v) DHP		18.38	19.01	19.24	19.92	50 % (v/v) DHP		13.39	14.15	14.47	14.70
20 % (v/v) DHP		20.18	21.11	21.34	22.10	60 % (v/v) DHP		15.61	16.16	16.60	16.95
30 % (v/v) DHP		10.37	10.90	11.33	11.68	Blank, 0 % (v/v) DHP	900	17.31	18.00	18.06	18.45
40 % (v/v) DHP		13.00	14.13	14.39	14.86	10 % (v/v) DHP		18.99	19.57	19.76	19.50
50 % (v/v) DHP		15.55	15.76	16.39	16.88	20 % (v/v) DHP		20.52	20.51	20.83	21.42
60 % (v/v) DHP		16.77	17.48	18.06	18.58	30 % (v/v) DHP		9.20	9.47	9.88	10.04
Blank, 0 % (v/v) DHP	400	18.59	19.35	19.29	19.89	40 % (v/v) DHP		12.51	12.98	13.00	13.41
10 % (v/v) DHP		20.00	20.95	21.29	21.92	50 % (v/v) DHP		14.61	15.15	15.53	15.80
20 % (v/v) DHP		10.53	10.85	10.77	11.69	60 % (v/v) DHP		16.73	17.33	17.64	17.89
30 % (v/v) DHP		13.10	13.71	13.82	14.73	Blank, 0 % (v/v) DHP	1000	18.67	19.19	19.55	19.71
40 % (v/v) DHP		15.61	16.03	16.07	16.75	10 % (v/v) DHP		19.98	20.62	21.05	21.45
50 % (v/v) DHP		17.02	17.76	17.86	18.47	20 % (v/v) DHP		10.39	11.34	11.87	11.73
60 % (v/v) DHP		18.69	19.48	19.43	20.20	30 % (v/v) DHP		13.08	14.33	14.72	14.98
Blank, 0 % (v/v) DHP	500	20.06	20.95	21.14	21.60	40 % (v/v) DHP		15.22	16.59	17.32	17.13
10 % (v/v) DHP		10.48	11.26	11.45	11.98	50 % (v/v) DHP		17.47	17.60	18.20	18.53
20 % (v/v) DHP		13.08	14.09	14.35	15.01	60 % (v/v) DHP		18.20	19.16	19.50	19.61
30 % (v/v) DHP		15.52	16.26	16.42	16.79						

Table S6. Electrodeposition average thermodynamic parameters within the temperature range 298 – 313 K for DHP solutions at different speeds of rotation

	rpm	E_a (kJ mol^{-1})	ΔH^* (kJ mol^{-1})	ΔS^* (J mol^{-1} K^{-1})	ΔG^* (J mol^{-1} K^{-1})
Blank, 0% (v/v) DHP	0	14.7	12.2	-185.1	68.7
10% (v/v) DHP		11.7	9.0	-198.9	69.9
20% (v/v) DHP		12.8	8.9	-197.5	70.6
30% (v/v) DHP		9.1	7.3	-212.2	71.3
40% (v/v) DHP		10.4	8.6	-211.0	72.3
50% (v/v) DHP		13.0	8.6	-206.0	73.4
60% (v/v) DHP		6.9	6.9	-228.6	74.2
Blank, 0% (v/v) DHP	100	27.9	25.4	-134.7	66.5
10% (v/v) DHP		22.2	18.5	-159.7	68.5
20% (v/v) DHP		16.3	25.4	-181.5	69.2
30% (v/v) DHP		13.7	13.3	-192.6	70.0
40% (v/v) DHP		26.8	14.8	-151.4	70.5
50% (v/v) DHP		23.2	12.6	-164.9	71.0
60% (v/v) DHP		9.5	2.8	-214.3	72.4
Blank, 0% (v/v) DHP	200	31.8	29.3	-119.1	65.7
10% (v/v) DHP		17.4	16.5	-172.2	67.4
20% (v/v) DHP		9.9	19.6	-198.6	68.0
30% (v/v) DHP		23.5	17.6	-156.6	68.8
40% (v/v) DHP		21.0	14.3	-166.9	69.4
50% (v/v) DHP		24.4	20.0	-157.9	70.1
60% (v/v) DHP		5.2	14.9	-225.7	71.6
Blank, 0% (v/v) DHP	300	32.0	29.4	-116.3	65.0
10% (v/v) DHP		20.7	16.1	-159.5	66.9
20% (v/v) DHP		16.9	20.0	-174.2	67.6
30% (v/v) DHP		21.9	18.1	-160.1	68.3
40% (v/v) DHP		19.8	15.5	-169.1	69.0
50% (v/v) DHP		23.3	15.6	-159.5	69.5
60% (v/v) DHP		18.1	12.6	-180.9	70.8
Blank, 0% (v/v) DHP	400	29.0	26.5	-124.9	64.6
10% (v/v) DHP		21.1	15.9	-156.5	66.4
20% (v/v) DHP		15.7	22.3	-176.6	67.1
30% (v/v) DHP		20.4	18.3	-163.4	67.8
40% (v/v) DHP		14.2	14.5	-185.8	68.4
50% (v/v) DHP		25.4	14.6	-151.7	69.2
60% (v/v) DHP		14.4	19.3	-191.5	70.4
Blank, 0% (v/v) DHP	500	26.7	24.2	-131.5	64.3
10% (v/v) DHP		21.8	16.4	-153.1	66.1
20% (v/v) DHP		16.7	21.9	-172.0	66.7
30% (v/v) DHP		23.2	17.8	-153.2	67.5
40% (v/v) DHP		19.4	18.6	-167.9	68.2
50% (v/v) DHP		20.1	23.2	-168.8	69.1
60% (v/v) DHP		19.0	18.4	-175.1	70.0
Blank, 0% (v/v) DHP	600	30.1	27.6	-119.0	63.9
10% (v/v) DHP		21.0	16.1	-154.9	65.8
20% (v/v) DHP		15.9	19.1	-173.9	66.4
30% (v/v) DHP		24.3	18.6	-148.7	67.2
40% (v/v) DHP		21.4	18.4	-160.7	68.0
50% (v/v) DHP		29.1	27.2	-138.1	68.7
60% (v/v) DHP		30.5	21.6	-136.4	69.6
Blank, 0% (v/v) DHP	700	33.5	30.9	-107.1	63.7
10% (v/v) DHP		20.9	16.9	-154.5	65.6
20% (v/v) DHP		19.0	24.9	-162.9	66.2
30% (v/v) DHP		21.0	17.6	-158.7	67.0
40% (v/v) DHP		20.2	16.2	-163.9	67.7
50% (v/v) DHP		34.3	25.0	-120.1	68.5
60% (v/v) DHP		32.8	26.7	-127.8	69.3
Blank, 0% (v/v) DHP	800	29.8	27.3	-118.4	63.5
10% (v/v) DHP		22.8	19.4	-147.7	65.4
20% (v/v) DHP		19.8	22.4	-159.4	66.0
30% (v/v) DHP		23.2	17.0	-150.8	66.7
40% (v/v) DHP		25.7	17.9	-145.1	67.4
50% (v/v) DHP		35.9	24.9	-114.2	68.2
60% (v/v) DHP		29.0	24.2	-139.9	69.2

Table S6. cont.

	rpm	E_a (kJ mol^{-1})	ΔH^* (kJ mol^{-1})	ΔS^* (J mol^{-1} K^{-1})	ΔG^* (J mol^{-1} K^{-1})
Blank, 0% (v/v) DHP	900	30.2	27.7	-116.6	63.3
10% (v/v) DHP		22.1	21.2	-149.5	65.2
20% (v/v) DHP		25.7	28.7	-139.6	65.8
30% (v/v) DHP		23.2	19.5	-150.5	66.6
40% (v/v) DHP		25.0	21.5	-146.5	67.2
50% (v/v) DHP		36.0	24.9	-113.3	68.1
60% (v/v) DHP		35.9	25.4	-116.4	68.9
Blank, 0% (v/v) DHP	1000	30.5	28.0	-114.9	63.1
10% (v/v) DHP		22.7	17.6	-146.7	65.0
20% (v/v) DHP		23.1	29.2	-147.6	65.7
30% (v/v) DHP		22.6	17.6	-151.8	66.4
40% (v/v) DHP		27.8	20.6	-136.9	67.1
50% (v/v) DHP		37.6	22.2	-107.3	67.9
60% (v/v) DHP		32.9	24.0	-125.5	68.7

Table S7. Values of diffusion coefficient (D) for all mixtures at different temperatures

	rpm	298 K D/(cm^2 s^{-1} x10^{-5})	303 K D/(cm^2 s^{-1} x10^{-5})	308 K D/(cm^2 s^{-1} x10^{-5})	313 K D/(cm^2 s^{-1} x10^{-5})
Blank, 0% (v/v) DHP	100	1.280	1.866	2.305	2.530
	200	1.016	1.439	1.441	2.468
	300	0.987	1.348	1.735	2.208
	400	0.918	1.268	1.497	1.914
	500	0.904	1.216	1.266	1.825
	600	0.879	1.291	1.463	1.928
	700	0.842	1.136	1.637	1.908
	800	0.873	1.179	1.450	1.848
	900	0.864	1.134	1.550	1.785
	1000	0.825	1.167	1.413	1.796
10% (v/v) DHP	100	0.451	0.568	0.626	0.769
	200	0.432	0.510	0.537	0.636
	300	0.365	0.443	0.511	0.582
	400	0.358	0.446	0.486	0.590
	500	0.336	0.433	0.487	0.561
	600	0.332	0.405	0.457	0.539
	700	0.317	0.395	0.453	0.509
	800	0.298	0.396	0.443	0.514
	900	0.302	0.383	0.437	0.505
	1000	0.297	0.378	0.424	0.512
20% (v/v) DHP	100	0.355	0.386	0.449	0.488
	200	0.387	0.386	0.415	0.440
	300	0.288	0.305	0.349	0.406
	400	0.288	0.284	0.333	0.387
	500	0.274	0.321	0.348	0.390
	600	0.268	0.295	0.330	0.368
	700	0.249	0.301	0.323	0.384
	800	0.245	0.273	0.310	0.382
	900	0.228	0.272	0.315	0.430
	1000	0.225	0.260	0.304	0.388
30% (v/v) DHP	100	0.249	0.244	0.243	0.332
	200	0.208	0.232	0.309	0.347
	300	0.173	0.247	0.240	0.303
	400	0.171	0.241	0.243	0.282
	500	0.163	0.206	0.236	0.284
	600	0.166	0.197	0.234	0.295
	700	0.165	0.193	0.224	0.265
	800	0.155	0.197	0.224	0.270
	900	0.152	0.183	0.213	0.263
	1000	0.149	0.186	0.209	0.256

Table S7. cont.

	rpm	298 K D/(cm^2 s^{-1} x10^{-5})	303 K D/(cm^2 s^{-1} x10^{-5})	308 K D/(cm^2 s^{-1} x10^{-5})	313 K D/(cm^2 s^{-1} x10^{-5})
40% (v/v) DHP	100	0.136	0.236	0.252	0.272
	200	0.164	0.173	0.218	0.256
	300	0.142	0.153	0.180	0.219
	400	0.150	0.170	0.175	0.200
	500	0.132	0.142	0.163	0.202
	600	0.116	0.139	0.157	0.190
	700	0.119	0.137	0.151	0.189
	800	0.111	0.133	0.168	0.202
	900	0.113	0.130	0.173	0.199
	1000	0.104	0.121	0.165	0.200
50% (v/v) DHP	100	0.140	0.160	0.196	0.237
	200	0.121	0.116	0.178	0.200
	300	0.108	0.125	0.168	0.178
	400	0.090	0.099	0.141	0.157
	500	0.084	0.088	0.111	0.128
	600	0.074	0.086	0.116	0.149
	700	0.066	0.084	0.115	0.158
	800	0.070	0.082	0.119	0.172
	900	0.065	0.083	0.117	0.163
	1000	0.066	0.081	0.105	0.178
60% (v/v) DHP	100	0.158	0.085	0.091	0.088
	200	0.137	0.069	0.068	0.067
	300	0.122	0.059	0.081	0.082
	400	0.102	0.060	0.071	0.078
	500	0.095	0.058	0.066	0.089
	600	0.084	0.053	0.069	0.108
	700	0.075	0.065	0.083	0.099
	800	0.079	0.057	0.076	0.092
	900	0.074	0.060	0.088	0.100
	1000	0.074	0.071	0.087	0.096

Table S8a. Dimensionless groups used in dimensional analysis for all solutions at 298 and 303 K

	rpm	298 K *Sh=kl/D*	*Sc=ν/D*	*Re=lU/ν*	303 K *Sh=kl/D*	*Sc=ν/D*	*Re=lU/ν*
Blank, 0% (v/v) DHP	100	92	771	705	83	475	784
	200	162	971	1409	148	616	1568
	300	217	1000	2114	202	658	2351
	400	272	1075	2818	252	699	3135
	500	320	1091	3523	299	729	3919
	600	368	1122	4228	332	687	4703
	700	416	1172	4932	388	780	5486
	800	451	1129	5637	420	752	6270
	900	491	1142	6342	462	782	7054
	1000	538	1196	7046	493	760	7838
10% (v/v) DHP	100	131	2262	681	126	1614	757
	200	217	2364	1362	212	1798	1514
	300	306	2797	2042	296	2070	2272
	400	377	2853	2723	361	2059	3029
	500	450	3037	3404	426	2117	3786
	600	514	3077	4085	496	2265	4543
	700	582	3225	4765	558	2326	5301
	800	653	3429	5446	612	2320	6058
	900	706	3383	6127	672	2395	6815
	1000	764	3437	6808	728	2429	7572

Table S8a. cont.

	rpm	298 K			303 K		
		Sh=kl/D	*Sc=ν/D*	*Re=lU/ν*	*Sh=kl/D*	*Sc=ν/D*	*Re=lU/ν*
20% (v/v) DHP	100	137	3291	594	137	2722	661
	200	215	3023	1189	223	2723	1322
	300	317	4060	1783	323	3446	1983
	400	388	4062	2377	405	3700	2644
	500	462	4270	2971	453	3278	3305
	600	529	4357	3566	531	3569	3966
	700	605	4703	4160	586	3490	4627
	800	668	4782	4754	666	3844	5288
	900	744	5121	5348	725	3859	5949
	1000	805	5202	5943	793	4045	6610
30% (v/v) DHP	100	147	5483	508	153	5040	565
	200	254	6583	1016	254	5306	1130
	300	361	7922	1524	329	4974	1695
	400	443	8009	2032	407	5111	2260
	500	526	8375	2540	503	5979	2825
	600	595	8264	3048	581	6256	3391
	700	664	8302	3556	651	6372	3956
	800	745	8815	4064	710	6254	4521
	900	814	8981	4572	792	6735	5086
	1000	883	9159	5080	847	6623	5651
40% (v/v) DHP	100	170	12139	420	145	6302	467
	200	259	10099	840	264	8605	935
	300	362	11645	1261	366	9701	1402
	400	434	11008	1681	432	8763	1870
	500	532	12563	2101	537	10463	2337
	600	633	14308	2521	615	10690	2804
	700	699	13912	2941	689	10861	3272
	800	786	14903	3362	765	11217	3739
	900	847	14593	3782	836	11407	4207
	1000	939	15826	4202	923	12240	4674
50% (v/v) DHP	100	157	14565	342	156	11415	380
	200	269	16733	684	283	15767	761
	300	372	18837	1026	366	14614	1141
	400	486	22573	1368	488	18513	1521
	500	581	24140	1710	593	20729	1902
	600	691	27402	2052	679	21195	2282
	700	801	30637	2394	764	21723	2662
	800	862	28991	2736	845	22242	3043
	900	960	31091	3078	915	22006	3423
	1000	1032	30937	3419	994	22612	3804
60% (v/v) DHP	100	139	16218	271	180	27130	302
	200	238	18633	543	314	33190	604
	300	329	20976	814	443	39275	906
	400	429	25135	1086	536	38119	1208
	500	514	26880	1357	637	39764	1510
	600	611	30512	1629	747	43491	1812
	700	708	34115	1900	774	35566	2114
	800	762	32281	2172	887	40101	2416
	900	849	34620	2443	947	38227	2718
	1000	912	34448	2715	964	32599	3020

Table S8b. Dimensionless groups used in dimensional analysis for all solutions at 308 and 313 K

% (v/v) DHP	rpm	308 K			313 K		
		Sh=kl/D	*Sc=ν/D*	*Re=lU/ν*	*Sh=kl/D*	*Sc=ν/D*	*Re=lU/ν*
Blank, 0% (v/v) DHP	100	80	349	865	80	290	948
	200	153	557	1730	131	297	1896
	300	191	463	2595	180	332	2844
	400	246	536	3460	232	383	3792
	500	305	634	4325	276	402	4740
	600	329	549	5190	308	380	5688
	700	352	491	6055	344	384	6636
	800	404	554	6920	382	397	7584
	900	428	518	7785	420	411	8533
	1000	476	568	8650	451	408	9481
10% (v/v) DHP	100	125	1328	836	120	987	916
	200	215	1549	1671	209	1193	1832
	300	291	1628	2507	287	1303	2748
	400	362	1709	3343	349	1287	3664
	500	423	1709	4179	415	1351	4580
	600	492	1818	5014	479	1407	5496
	700	550	1836	5850	544	1489	6412
	800	608	1876	6686	596	1477	7328
	900	664	1905	7522	651	1501	8244
	1000	722	1960	8357	697	1483	9160
20% (v/v) DHP	100	135	2124	730	135	1782	800
	200	225	2297	1459	228	1974	1599
	300	318	2731	2189	311	2139	2399
	400	396	2861	2918	387	2243	3198
	500	455	2736	3648	451	2231	3998
	600	527	2889	4377	523	2361	4798
	700	592	2952	5107	574	2266	5597
	800	659	3068	5836	632	2278	6397
	900	712	3022	6566	658	2021	7196
	1000	776	3138	7296	734	2241	7996
30% (v/v) DHP	100	159	4577	624	147	3060	684
	200	237	3607	1247	235	2933	1367
	300	344	4642	1871	327	3353	2051
	400	420	4593	2495	411	3608	2734
	500	496	4728	3118	479	3578	3418
	600	564	4755	3742	537	3450	4101
	700	639	4983	4366	621	3832	4785
	800	702	4984	4989	677	3759	5468
	900	775	5232	5613	742	3867	6152
	1000	840	5332	6237	807	3973	6836
40% (v/v) DHP	100	147	5346	516	148	4515	565
	200	251	6177	1032	245	4796	1131
	300	357	7466	1548	344	5615	1696
	400	442	7710	2063	434	6133	2262
	500	530	8280	2579	506	6081	2827
	600	609	8565	3095	588	6466	3392
	700	688	8892	3611	656	6497	3958
	800	727	8007	4127	703	6074	4523
	900	782	7783	4643	768	6170	5088
	1000	857	8172	5159	825	6133	5654
50% (v/v) DHP	100	150	8465	420	144	6364	460
	200	252	9295	840	249	7568	920
	300	341	9858	1259	345	8486	1380
	400	444	11723	1679	442	9645	1840
	500	565	14860	2099	555	11831	2300
	600	633	14304	2519	597	10133	2761
	700	706	14348	2939	652	9580	3221
	800	767	13931	3358	693	8756	3681
	900	837	14139	3778	769	9293	4141
	1000	938	15800	4198	801	8486	4601
	800	832	27562	2666	800	20655	2922
	900	856	23683	2999	845	19060	3287
	1000	927	24087	3333	922	19793	3653

Table S8b. Dimensionless groups used in dimensional analysis for all solutions at 308 and 313 K

% (v/v) DHP	rpm	308 K			313 K		
		Sh=kl/D	*Sc=ν/D*	*Re=lU/ν*	*Sh=kl/D*	*Sc=ν/D*	*Re=lU/ν*
100	181	22797	333	190	21614	365	60% (v/v) DHP
	200	328	30803	667	339	28244	731
	300	409	25872	1000	420	23213	1096
	400	523	29266	1333	522	24242	1461
	500	630	31754	1666	584	21484	1826
	600	701	30046	2000	618	17609	2192
	700	734	25221	2333	711	19250	2557

Table S9. Dimensionless correlation constants a and b under all studies conditions

	298 K	303 K	308 K	313 K
Constant *a*				
Blank, 0% (v/v) DHP	0.1010	0.0993	0.0996	0.0982
10% (v/v) DHP	0.1031	0.1026	0.1025	0.1014
20% (v/v) DHP	0.1036	0.1042	0.1036	0.1046
30% (v/v) DHP	0.1058	0.1063	0.1065	0.1052
40% (v/v) DHP	0.1084	0.1055	0.1060	0.1060
50% (v/v) DHP	0.1058	0.1064	0.1055	0.1074
60% (v/v) DHP	0.1063	0.1124	0.1138	0.1157
Constant *b*				
Blank, 0% (v/v) DHP	0.7044	0.7051	0.7038	0.7044
10% (v/v) DHP	0.7052	0.7046	0.7041	0.7046
20% (v/v) DHP	0.7059	0.7044	0.7044	0.7023
30% (v/v) DHP	0.7054	0.7037	0.7027	0.7033
40% (v/v) DHP	0.7040	0.7066	0.7049	0.7040
50% (v/v) DHP	0.7096	0.7078	0.7074	0.7039
60% (v/v) DHP	0.7096	0.7029	0.7000	0.6970

Table S10. Values of the limiting current density (I_l), angular velocity (ω), kinematic viscosity (ν), diffusion coefficient (D), and dimensionless groups used in dimensional analysis for blank and 20% (v/v) DHP at high speeds of rotation and 298K

	I_l (mA cm^{-2})	rpm	ω	ν (stoke)	D (cm^2 s^{-1} x 10^5)	Sh=kl/D	Sc=ν/D	Re=lU/ν
Blank, 0% (v/v) DHP	67.57	1500	157.1	0.0098616	0.458	912	2086	11294
	83.32	2000	209.4		0.464	1110	2060	15059
	96.50	2500	261.8		0.457	1305	2090	18823
	103.55	3000	314.2		0.419	1530	2284	22588
	118.50	3500	366.5		0.436	1679	2191	26352
	125.85	4000	418.9		0.415	1877	2307	30117
	129.87	4500	471.2		0.383	2097	2497	33882
	147.25	5000	523.6		0.415	2194	2304	37646
	148.46	5500	576.0		0.379	2422	2523	41411
	151.03	6000	628.3		0.354	2638	2700	45176
20% (v/v) DHP	38.62	1500	157.1	0.012545	0.186	1242	4973	11294
	46.51	2000	209.4		0.181	1532	5094	15059
	54.30	2500	261.8		0.181	1793	5105	18823
	62.02	3000	314.2		0.182	2031	5062	22588
	69.81	3500	366.5		0.185	2249	4981	26352
	76.33	4000	418.9		0.184	2475	5014	30117
	78.91	4500	471.2		0.171	2762	5412	33882
	87.20	5000	523.6		0.178	2931	5197	37646
	102.85	5500	576.0		0.207	2967	4461	41411
	100.31	6000	628.3		0.181	3307	5098	45176
	104.62	6500	680.7		0.177	3525	5209	48940
	97.60	7000	733.0		0.147	3970	6289	52705