

**SOLVATION OF CARBOHYDRATES IN FIVE CHOLINE CHLORIDE-BASED DEEP EUTECTIC SOLVENTS AND THE
IMPLICATION FOR CELLULOSE SOLUBILITY**

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Supplementary information

3 pages

Table SI 1. Solubilities of the carbohydrates in different DESs and ethylene glycol at 25 °C

		Glucose	Erythritol	Sucrose	Cellobiose
Ethaline	mg/ml	249 ± 4.7	113 ± 14.2	275 ± 10.5	19 ± 1.0
	mol/%	25 ± 0.6	18 ± 2.7	16 ± 0.7	1.3 ± 0.1
Ethylene glycol*	mg/ml	156 ± 13.3	65 ± 10.5	110 ± 10.1	5.0 ± 3.9
	mol/%	4.6 ± 0.4	2.9 ± 0.5	1.8 ± 0.2	0.08 ± 0.1
Pentaline	mg/ml	68 ± 9.0	28 ± 3.7	41 ± 1.9	3.1 ± 0.2
	mol/%	16 ± 2.4	10 ± 1.5	6 ± 0.3	0.4 ± 0.03
Glyceline	mg/ml	240 ± 4.4	96 ± 3.1	142 ± 1.3	10 ± 3.4
	mol/%	27 ± 0.7	18 ± 0.7	10 ± 0.1	0.8 ± 0.3
Reline	mg/ml	143 ± 7.0	208 ± 15.7	182 ± 23.7	17 ± 4.9
	mol/%	14 ± 0.8	26 ± 2.6	10 ± 1.4	1.0 ± 0.3
Oxaline	mg/ml	162 ± 1.8	230 ± 4.4	299 ± 25.4	19 ± 3.1
	mol/%	16 ± 0.2	29 ± 0.8	16 ± 1.6	1.2 ± 0.03

The standard deviation for the amount of individual polysaccharides was less than 5%. Similar results concerning the standard deviation were also obtained in an earlier study on carbohydrate analysis by GC and HPLC after acid or enzymatic hydrolysis of pulp samples^{1,2}.

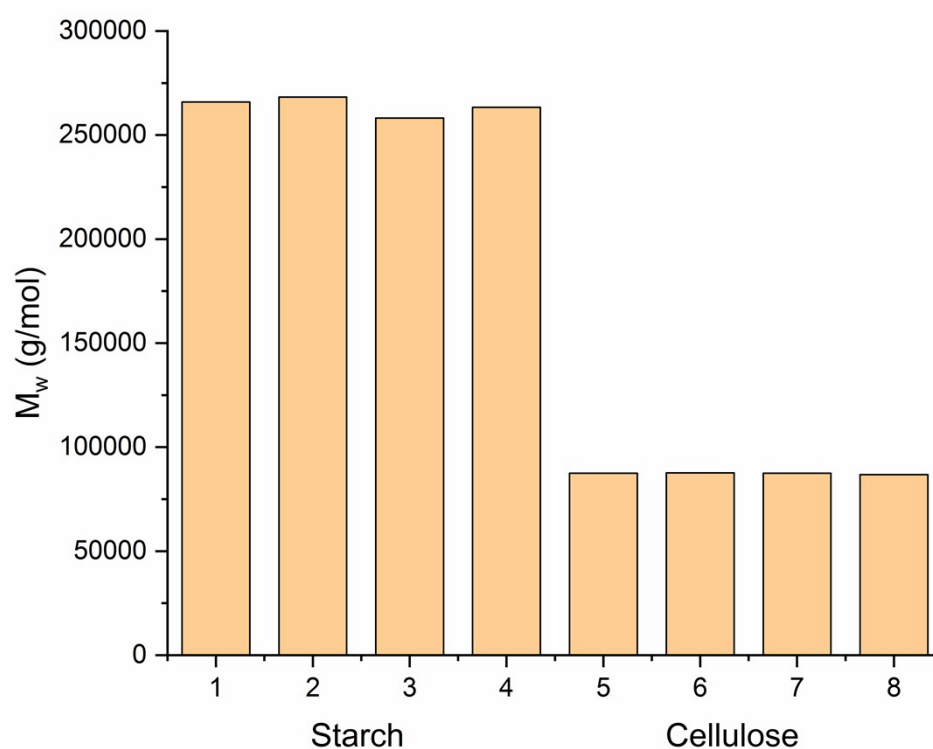


Fig. SI 1. Molecular weights of starch and cellulose obtained by SEC.

References

- 1 S. Willför, A. Pranovich, T. Tamminen, J. Puls, C. Laine, A. Suurnäkki, B. Saake, K. Uotila, H. Simolin, J. Hemming and B. Holmbom, *Ind. Crops Prod.*, 2009, **29**, 571–580.
- 2 A. Jacobs, Report from the NSP Network group for carbohydrate analysis, In: 2nd Chemical Analysis Seminar, Stockholm, Sweden, March 17–18, 2003.

	T	Mw of HBD	m of HBD	n of HBD	X of HBD	Mw of salt	m of salt	n of salt	X of salt	Cp of HBD at T(298K)	Cp of salt at T(298K)	Ideal Cp of Mixture	Real specific Cp of Mixture at T(298°C)	Molar mass of mixture	Real Molar Cp of Mixture	ΔC_p	$\Delta H =$ (ΔC_p)*°K	$\Delta H/1000$
	°K	g/mol	g	mol		g/mol	g	mol		J/mol.K	J/mol.K	J/mol.K	J/g.K	g/mol	J/mol.K	J/mol.K	J/mol	kJ/mol
Ethaline	298.15	62.07	200.69	3.23	0.67	139.62	224.95	1.61	0.33	149.60	149.69	149.63	1.88	87.86	165.18	15.55	4636.62	4.64
Glyceline	298.15	92.09	250.17	2.72	0.66	139.62	193.71	1.39	0.34	218.90	149.69	195.50	2.09	108.16	226.06	30.56	9110.46	9.11
Oxaline	298.15	90.03	200.06	2.22	0.50	139.62	310.45	2.22	0.50	105.90	149.69	127.80	1.86	114.84	213.60	85.80	25580.11	25.58
Pentaline	298.15	104.15	372.03	3.57	0.78	139.62	142.97	1.02	0.22	232.49	149.69	214.04	1.86	112.05	208.42	-5.63	-1677.85	-1.68
Reline	298.15	60.06	200.50	3.34	0.67	139.62	232.52	1.67	0.33	92.79	149.69	111.73	1.92	86.54	166.15	54.43	16227.57	16.23

Table S2: Calorimetric data used to determine the enthalpy of interaction in DESs