antioxidants

MDPI

SUPPLEMENTARY MATERIAL

Extraction of bioactive metabolites from *Achillea Millefolium* L. with choline chloride based natural deep eutectic solvents; study of antioxidant and antimicrobial activity

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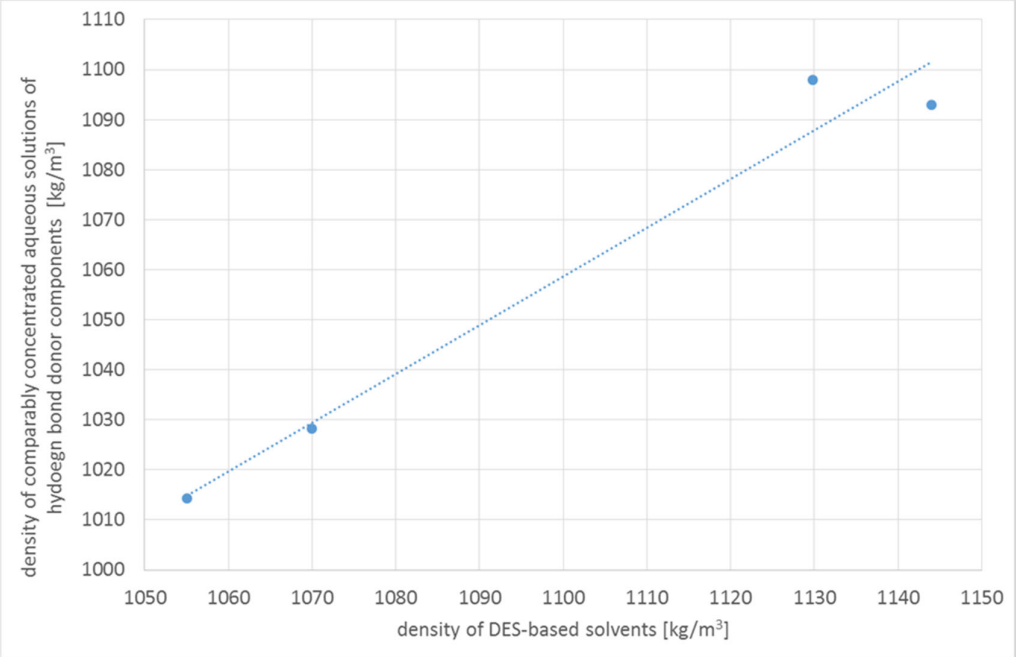


Figure S1. Correlation between the density of the studied NADES (the point for choline chloride:fructose:water DES is omitted) and the density of aqueous solutions containing hydrogen bond donor (HBD) components (1,4-butanediol, 1,2-propanediol, lactic acid, and urea, respectively) of comparable concentrations. The data refer to the temperature 25 °C (298.15 K).

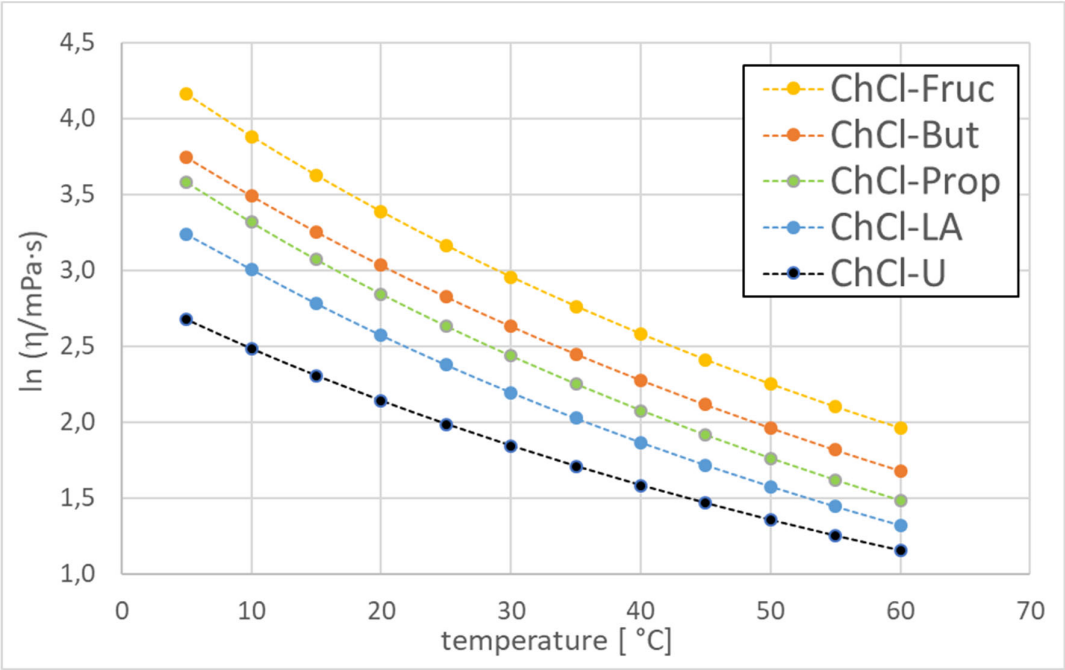


Figure S2. Temperature dependence of η (logarithmic scale) of the studied NADES containing 25% water (w:w) as described by the VFT model (broken lines) in comparison with the experimental data (points).

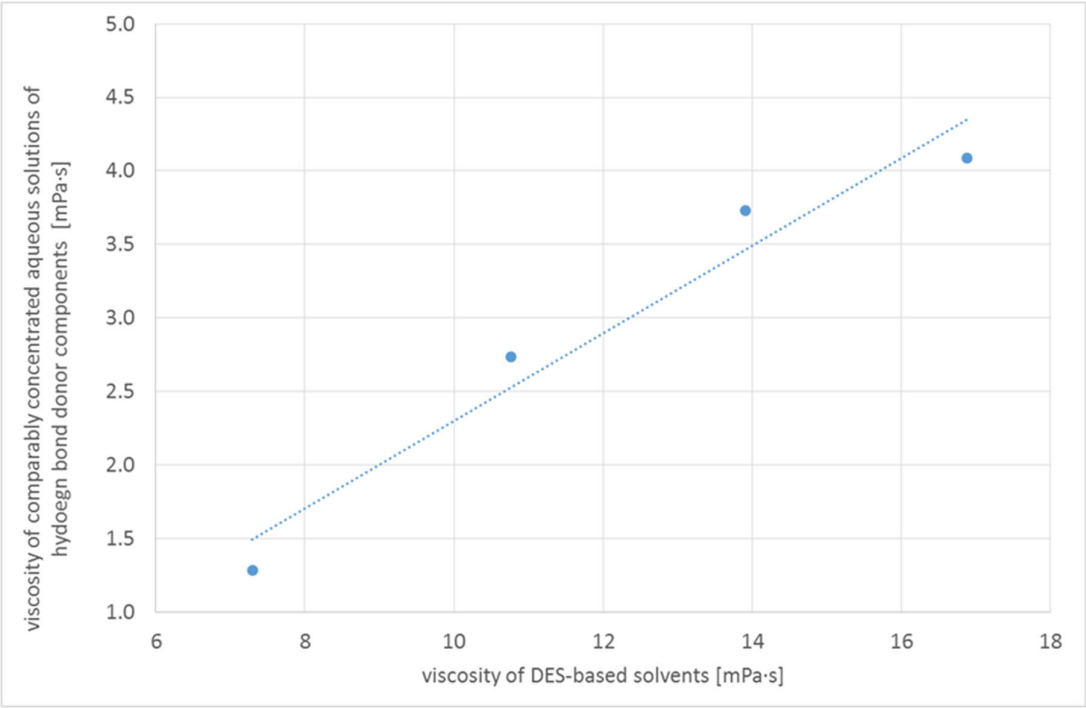


Figure S3. Correlation between the viscosity of the studied NADES (the point for choline chloride:fructose:water NADES is omitted) and the viscosity of aqueous solutions containing HBD components (1,4-butanediol, 1,2-propanediol, lactic acid, and urea, respectively) of comparable concentrations. The data refer to the temperature 25 °C (298.15 K).

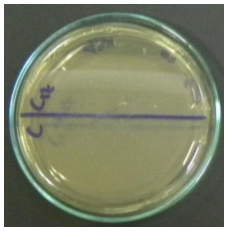
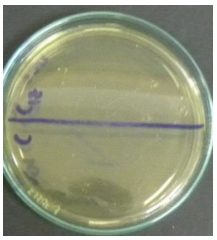
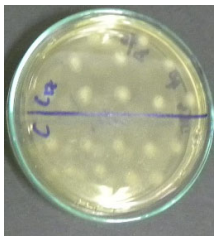
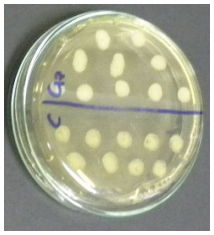
Concentration (%, v:v)	12 %	10%	8%	6%
C. albicans isolate				
C. albicans ATCC 10231				

Figure S4. Antifungal activity (MIC) of urea-based NADES (ChCl-U) on *Candida albicans* ATCC 10231 (C) and *Candida albicans isolate* (Ci).

	ChCl-U (pure solvent)	ChCl-U (extract)
100%		
50%		

Figure S5. Antimicrobial activity of choline chloride-urea besed NADES (ChCl-U; pure solvent) and ChCl-U extract on *Staphylococcus aureus* ATCC 25923 (disk diffusion method).

Table S1. Values of empirical coefficients from the Vogel-Fulcher-Tammann (VFT) equation (eq. 1 in the manuscript) obtained by fitting the VFT model to experimental data for the studied NADES. The temperature range of fitting was 5-60 °C (278.15-333.15 K).

NADES	ln (*A*/η°)	*B* [K]	T_0 [K]	η range (mPa·s)
ChCl-LA	-3.167	821.09	150.03	25.5–3.7
ChCl-But	-3.419	971.92	142.52	42.4–25.4
ChCl-Prop	-3.259	849.02	154.03	35.9–4.4
ChCl-Fruc	-2.946	870.89	155.61	64.1–7.1
ChCl-U	-2.279	612.87	154.48	14.5–3.2