REGATA

Rede Galega de Tratamento de Augas

Research Stays 2015

Design of novel biocompatible solvents for the removal of water contaminants

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Objectives

The aim of this research was the development of new ionic liquids considered as "green solvents" to improve wastewater treatment by Aqueous Biphasic Systems. The viability of new these room-temperature ionic liquids (RTILs) from natural feedstocks (choline chloride and dipeptides) was assessed following a green route in which the only by-product is water. Five glycine-based dipeptides were employed as anions.

Methodology

Synthesis:

A method involving the use of choline hydroxide as reactant to neutralize a series of dipeptides (in aqueous solution) was used.

Characterization:

- Structure: ^{1}H & ^{13}C NMR and FTIR.
- Thermal Properties: DSC and TGA.
- %Water: Karl Fisher Titration Method.

Results

Choline hydroxide cation exhibited an excellent ability to form RTILs with dipeptides.

Salt	%Water	T_g (°C)	T_d (°C)
[Ch] [Gly-L-Ala]	<0.2	-56.7/-52.3	190.7
[Ch] [Gly-L-Leu]	<0.2	-13.9/-10.5	193.5
[Ch] [Gly-L-Ser]	<0.3	-55.4/-50.3	193.1
[Ch] [Gly-L-Asp]	<1.0	-10.7/8.7	152.5
[Ch] [Gly-L-Glu]	<0.4	-16.4/-6.2	147.7

DSC measurements showed that these RTILs had no melting point, but a glass transition temperature (T_g) ranging from -57 to 9ºC. Also, TGA data reveals the existence of two clear trends: one, where the liquids were stable at temperatures of at least 190ºC; and the other at around 150ºC.

Highlights

Novel neoteric solvents “RTILs” were synthesized from a series of dipeptides. These findings should be useful for designing suitable pollutant extraction strategies from aqueous effluents by means of aqueous biphasic systems.

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