

Chemistry Department

Ionic liquids based on CO₂ and super-bases and Phase equilibrium Studies

Processes with Supercritical Fluids / Photochemistry



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(Pos-Doc)

Degree in Applied Chemistry by FCT/UNL in 2004. PhD in Organic Chemistry in 2009 by FCT/UNL with IST/UTL research group.

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Objectives

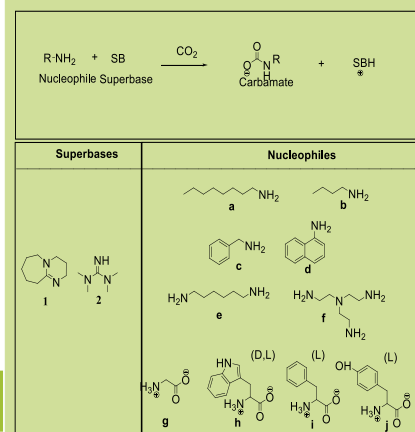
- 1) Synthesis and characterization of carbamate based ionic liquids and molten salts based on amines, diamines, polyamines, biological molecules, CO₂ and organic superbases.
- 2) Phase equilibrium studies on ternary and quaternary systems, achievement of phase boundaries and correlation of experimental results.

Methodology

- 1) To the synthesis of carbamate based ionic liquids, mono functionalized amines (with alkyl or aryl groups), diamines, trifunctionalized amines, aminoacids and other biological molecules were used as nucleophiles. The electrophile tested is CO₂. DBU and tetramethylguanidine are the superbases tested.
- 2) High pressure equipment and, in some cases, also chromatographic techniques were used to access composition of gaseous and liquid phases in equilibrium from a mixture of several compounds present during a reaction. The obtained compositions were processed with computational tools in order to correlate the experimental results.

Expected Results

- ✓ New carbamate salts were prepared based on mono-alkyl and aryl amines, multi-functionalized amines and aminoacids using DBU and tetramethylguanidine as superbases.
- ✓ New dicarbamates and tricarbamates were obtained which open new perspectives concerning the possibility to obtain polycarbamates.
- ✓ The multi-functionalized carbamate based systems can be relevant in the context of CO₂ capture.
- ✓ Studies with amino acids and other biological molecules are in progress
- ✓ Phase boundaries were attained for the systems under study
- ✓ Correlation of the experimental studies obtained are in progress



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