Recent Developments in the Design and Use of Task-Specific Ionic Liquids (TSIL) for Reactive Chemical Separations

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In all the aforementioned cases, the TSIL is designed from the ground-up to incorporate a functional group appropriate to give rise to the type of interaction desired between the TSIL and the planned substrate/solute. In the case of TSIL used for separations, these functional groups are commonly species capable of forming covalent or coordinate covalent (dative) bonds with the substrate. For example, some TSIL used for metal ion extraction have incorporated Lewis basic thiourea groups capable of coordinating to the target metal cations. In the case of acid gas capture (specifically CO2), the groups have been appended amines.

The first generation of amine appended IL proved to be somewhat tedious to prepare and purify. Consequently, we have been engaged in an effort to develop alternative synthetic approaches to these compounds, with encouraging results. Further, we have found that TSIL incorporating appended hydrazide groups are easy to prepare and purify, and have a reactivity profile for separations similar to that of the amine appended TSIL. In our talk, we will outline the newest approaches for the synthesis of TSIL amines, as well as the syntheses of the new TSIL hydrazide complexes. Further, we will report our results on the use of these and other compounds for the reactive separations of CO2 as well as other organic carbonyl-containing compounds.