

**Not merely solvents: task-specific ionic liquids made by green syntheses.**

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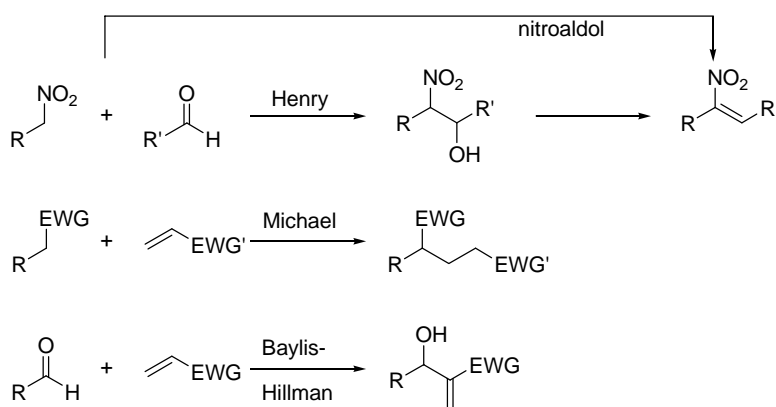
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We describe a class of phosphonium and ammonium ionic liquids made by green synthesis (A) and designed to be solvents (B), catalysts (C), and to aid in product separation (D).

*Synthesis* Amines and phosphines with dimethylcarbonate (DMC), yield pure methyl-ammonium and methyl-phosphonium salts. The substituents on the nitrogen and phosphorous determine whether the products are liquid, *i.e.* ionic liquids (ILs), and their solvent ability. The quaternarization with DMC is a green alternative to methylation using methyl halides and dimethylsulfate, and affords directly an IL that is set up for a simple and halide-free anion metathesis step. The metathesis is carried out using the conjugated acid of the desired anion, CH<sub>3</sub>OH and CO<sub>2</sub> are the only by-products. These ILs are characterized in the neat state by one- and two-dimensional NMR. With a view of using them as task-specific solvents, the neat NMR spectra provide a degree of information on the cation-anion interactions. And, in perspective, on reactant-IL interactions as well.

*Applications in synthesis* This class of ionic liquids has so far found applications in multiphase catalysis,<sup>1,2</sup> nanoparticle formation,<sup>3</sup> and ionic liquid mediated carbon-carbon bond forming reactions.

We will describe the synthesis, characterisation, and application of these ILs. They are very active basic catalysts for base-promoted C-C bond forming addition reactions such as the Michael, Henry, nitroaldol, and Baylis-Hillman reactions. These do not require added solvents, or catalysis by base or metals.



1. S. Paganelli, A. Perosa, M. Selva, *Adv. Synth. Catal.*, 2007, **349**, 1858-1862.
2. P. Tundo, A. Perosa, *Chem. Soc. Rev.*, 2007, **36**, 532-550.
3. A. Perosa, P. Tundo, M. Selva, P. Canton, *Chem. Commun.*, 2006, 4480-4482.