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Editorial

Although often thought of as new reaction media, ionic liquids have been utilised for catalytic processes since 1986 when it was first reported that ionic liquids could be used to catalyse Friedel-Crafts acylations. In addition, Eastman Chemicals used ionic liquids commercially for the isomerisation of 3,4-epoxybutane to 2,5-dihydrofuran between 1996 and 2004. However, the true potential of ionic liquids and the wide range of applications for which they may be utilised has only been realised over the last decade. Over this period of time, these solvents have been examined for use in embalming, electrochemistry, tribology, catalysis and organic and inorganic synthesis to name a few. The rapidly expanding interest has led to a number of good reviews covering the area of ionic liquids in general, as well as a wealth of publications.

Ionic liquids are often considered merely as green alternatives to volatile organic solvents, notably chlorinated hydrocarbons; however, in many catalytic processes it is their ionic character and structure which is of most interest. Their ionic character often lead to distinct chemoselectivities, enantioselectivities and activity compared with analogous reactions in molecular solvents. Careful benchmarking is vital in order to assess the applicability of the ionic liquid for a given process. By understanding the effect of the ionic liquid both in terms of chemistry and chemical engineering, e.g. mass transfer effects, control over the overall process may be achieved which can lead to increased rates, selectivity and simplified workup procedures.

Ionic liquids have been utilised in a wide range of arrangements for catalytic processes. For homogeneous catalysis ionic liquids have been used as alternative solvents in monophasic and in biphasic catalysis with both molecular solvents and by immobilising the ionic liquid on a solid support. In these cases the catalyst can be entrapped or "immobilized" allowing isolation of the organic product by extraction or distillation and the ionic liquid/catalyst system to be reused. Critically, the ionic liquid allows the catalyst to be recycled and the ionic liquid to be recovered which is vital given the cost of many catalysts and ionic liquid systems. Analogous considerations also exist for heterogeneous catalysts and biocatalysts.

This special issue on catalysis in ionic liquids captures the diversity of catalysis in ionic liquids demonstrating the applicability of homogeneous-, heterogeneous- and bio-catalysis in this rapidly expanding field.

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