Preface

The past ten years have seen the emergence of a number of techniques aimed at expediting the synthesis and purification of compounds for evaluation in biological assays. During the early 1990s, application of these techniques began to gain momentum, particularly within the pharmaceutical industry, where approaches such as solid phase organic chemistry[1] and automated synthesis[2] were greeted with enthusiasm by some – particularly those of us involved in combinatorial library synthesis – though with a degree of scepticism by others.

Other techniques have, however, gained widespread approval amongst researchers involved in several disciplines of organic chemistry. Whilst it has been suggested that solid phase synthesis is a subject in decline,[3] the development of polymer-supported reagents and ion exchange resins and their uses in organic synthesis have been the subject of steady literature focus since the 1970s. In particular, the application of these reagents to solution-based parallel synthesis and combinatorial chemistry has increased dramatically over the past three years. The reasons for this are clear: functionalized polymers mediate a wide breadth of organic transformations, serving as stoichiometric reagents and catalysts, and also functioning as purification media.

Synthetic reactions promoted by functionalized polymers can be performed on both milligram and gram scales, and can be monitored using traditional analytical methods. Upon completion of a reaction, most functionalized polymers can be removed by filtration, and in several cases may be recycled many times over without appreciable loss of reactivity. It is possible to use functionalized polymers in excess to drive reactions to completion without contaminating the product solution; additionally, they are largely odourless and non-toxic, and have no significant associated handling hazards.

Review articles outlining the applications of functionalized polymers have appeared elsewhere.[4] However, the purpose of this special edition of *Combinatorial Chemistry &d High Throughput Screening* is to bring together a collection of original research papers from several of the principal exponents of the uses of supported reagents and ion exchange resins in organic synthesis. The edition outlines research efforts covering the development and uses of new polymeric reagents, including supported catalysis for hydrosilylation, and functionalized soluble polymers; applications of ion exchange resins in the purification of compound libraries, and multi-step synthesis using a sequence of supported reagents are also described. Through the individual contributions, this edition illustrates the power the methods promoted by functionalized polymers, along with the simplicity of their practical execution.

Functionalized polymers play an extremely valuable role in organic synthesis. There remains a continuing need for new functionalized polymers, and over the coming years we will doubtless see increased efforts geared towards the development of novel supported reagents and ion exchange resins for use in a broader range of organic transformations. We should also expect many more reported applications of these reagents to multiple-step sequences within parallel synthesis.

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References

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Stephen J. Shuttleworth
Tularik Inc.
2 Corporate Drive
South San Francisco
CA 94080
USA
Tel: (650) 825 7300, fax: (650) 825 7433
e-mail: sshuttleworth@tularik.com