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Preface

Green Chemistry. Who would have thought one adjective could do so much for chemistry? That it could take what oftentimes raises negative connotations, at least in the minds of the public, and elicit positive sentiments. How does anyone today respond to the seemingly simple question: '*What is green chemistry*'? Are there 'right' and 'wrong' answers? Probably not, but how does an expert define this term introduced by co-Editor Paul Anastas, of *The 12 Principles of Green Chemistry* fame? As originally scribed, his definition reads: 'The design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.' In capturing the spirit of these twelve principles, contributing author Roger Sheldon and co-workers have suggested in their monograph *Green Chemistry and Catalysis*: *'Green chemistry efficiently utilizes (preferably renewable) raw materials, eliminates waste and avoids the use of toxic and/or hazardous reagents and solvents in the manufacture and application of chemical products'*. Additional insight can be found at the web site of the U.S. EPA (Environmental Protection Agency), its research program now directed by … Paul Anastas. This URL provides a valuable overview, much akin to that found in the Sheldon monograph. More focus to help 'consumers' in the chemical community looking to learn about green chemistry comes from a variety of forums: e.g., the journal, *Green Chemistry*, dedicated entirely to this sub-discipline; as well as a multitude of yearly green chemistry conferences, including a Gordon Conference solely on this theme. There's also an issue of *Chemical & Engineering News* devoted to 'sustainability' (August 18, 2008).

As society is increasingly forced to direct more attention to environmental concerns, chemists will play ever-expanding roles. Part of our 'job' will be to devise new processes that eventually augment or better yet, fully replace, that portion of existing industrial chemistry instituted in an era where the impact of chemical waste, while an economic factor, was not a major consideration. That's all changed today; factors such as worker safety, use of non-hazardous materials, and energy consumption, really matter. And there's more good news, with growing evidence documenting that processes 'benign by design' are usually more economically favorable than those devised using traditional approaches.

So with green chemistry here to stay, its further exposure in the form of a *Symposium-in-Print* seems timely, and maybe even, overdue. Highlighted herein are efforts by groups throughout the world whose research is devoted, at least in good measure, to this important field. This is, in fact, the first such thematic issue on such a topic in this time-honored *Tetrahedron* series, and many of the most active research groups are represented. In this issue alone one will get a feeling for the breadth of the field, as well as a sense of the creative spirit of chemists who are responding with novel chemistry to some of the environmental challenges before us. From greener organic solvents to no organic solvent, from fluorous media to no medium, 'switchable' solvents, homo- and heterogeneous *catalysis*, nano*catalysis*, asymmetric *catalysis*, and applications of microwave technology… and an analysis *in silico* as to how to design physiologically active chemicals so as to minimize their human toxicity. In a bigger picture sense, imagine the progress that could be made in tackling chemical problems of global proportions if just 5% of each research group's effort was dedicated to 'green chemistry!'

Given the rapid growth and importance of green chemistry, a new feature has been added to this special issue: commentaries by a few of the leaders in the field. Paul Anastas, Ryoji Noyori, and Elizabeth Kang share their insights on going green: where from, where to, how to, and what's ahead.

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