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Microwave Synthesis for Everyone

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Microwave-assisted organic synthesis is rapidly finding general acceptance by a wider group of users. Personal Chemistry, the pioneer in commercial systems supporting microwave synthesis and currently addressing over 70% of the market demand, estimates that by this summer, over half a million microwave-assisted reactions will have been run by chemists. Industrial chemists, not only like the fact that the iterative development cycle for designing novel compounds is much faster and easier when using the technique, but also that microwave synthesis opens up new opportunities to use greener chemistry.

The demand, in Drug Discovery, for more efficient, cleaner and convenient methods in chemistry is widely voiced by the pharma/biotech industry and recognised by the academic community. The potential of microwave synthesis to contribute to this, by providing access to faster, greener, and reproducible methods is being fully utilized. This is clearly shown by the work of several high profile British researchers, who are applying microwave synthesis to areas such as combinatorial chemistry to gain time and material efficiency (Richard Brown and Mark Bradley, Southampton University); carbon-carbon coupling using water as a solvent (Nicholas Leadbeater, King's College, London), and the use of polymer bound reagents, as substitutes for the far more toxic conventionally employed compounds (Ian Baxendale and Steven Ley, Cambridge University).

Although the ability to carry out fast and reproducible chemistry is attractive, the most appealing aspect of microwave synthesis is direct scalability of reactions.

Controlled, microwave heating, unlike conventional heating, is able to provide uniform heating throughout a reaction mixture – this results in cleaner reactions and enables greater reproducibility. A direct consequence of this high degree of reproducibility, is the ability to scale-up reactions with little or no method development, unlike conventional methods where months of effort are required to convert a reaction from lab-scale to large-scale. This relatively new development provides an added incentive to chemists and managers alike, for microwave irradiation to be used during all stages of chemistry development. This is highlighted by the fact that major UK pharmaceutical companies such as GSK, Merck and AstraZeneca, who have tried and tested the technology and as a result are requesting convenient, safe, large-scale microwave systems to be developed for their research operations.

In response to the growing acceptance of microwave synthesis technologies, Personal Chemistry has launched an e-magazine to keep both novices and veterans abreast of the literature, commentary and technological developments in the rapidly growing field of microwave synthesis. Subscriptions are currently being registered at www.personalchemistry.com/emag.