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More On Microwaves

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A pair of Florida State University research teams has conducted a more thorough study of the thermal effects of using microwave reactors in organic synthesis. Gregory B. Dudley, Albert E. Stiegman, and coworkers have solidified their earlier findings that microwaves can produce localized heating effects that deviate from known kinetics parameters and accelerate reaction rates beyond what is possible with conventional heating. In one case the researchers show that microwave heating of an ionic reactant in a non-microwave-absorbing (nonpolar) solvent produces a reaction that behaves as if it were being heated at a temperature 20 °C higher than what was recorded (*J. Org. Chem.* 2014, DOI: 10.1021/jo501153r). In a second case, the researchers characterized the thermal effect by observing that a reaction carried out using variable microwave power to maintain constant temperature produces negligible rate enhancement, yet when operating at constant microwave power leading to a variable temperature, they can achieve up to a ninefold enhancement in reaction rate (*J. Org. Chem.* 2014, DOI:10.1021/jo5011526). Dudley and Stiegman postulate that selective microwave heating of the reactants, not just the bulk solution temperature, is behind the microwave phenomenon and that it could be exploited for new applications in organic synthesis.

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