PL-8

MICROWAVE EFFECTS IN ORGANIC SYNTHESIS ACCORDING TO REACTION MEDIUM AND MECHANISMS

André Loupy

Director of Research CNRS, Paris-South University, Orsay, France

Accelerations of organic reactions by microwaves are largely exemplified. They can result from material-wave interactions leading to thermal effects (connected to dipolar and charge polarizations and inversion in alternance of electric field) and specific (non-purely thermal) effects. They can be understood by considering electrostatic (polar) effects resulting from dipole-dipole type interactions between the electric field and polar molecules or ntermediates, inducing reduction in the activation energy. The case of solvent-free reactions (Green Chemistry) is by far the more propitious to observe specific effects as no masked by solvents.

In order to get some experimental evidences for specific effects, and consequently to underline the wide interest of this technology, there is a need for cautious and reliable results under microwaves and conventional heating. To this purpose, we can use reactors especially dedicated to chemistry, with accurate control of temperature, emitted power and pressure all along the reaction, under mechanical stirring, with similar profiles of raising in temperature under both kinds of activation.

The specific MW effects will be considered according to reaction media and mechanisms. They are essentially involved in the case of non-polar solvents, as they are transparent to the radiation. They are evident in the case of polar mechanisms where the transition states are more polar (and therefore more sensitive to microwave) than the ground states of the reactions. They are more pronounced in the case of late transition states along the reaction coordinates.

References

1. Loupy, A. (edit), « Microwaves in Organic Synthesis », Wiley-VCH, Weinheim, second edition, **2006**.
2. Loupy, A.; Petit, A.; Hamelin, J.; Texier-Boullet, F.; Jacquault, P.; Mathé, D. **1998**, *Synthesis*, 1213-1231.
3. Perreux, L.; Loupy, A. *Tetrahedron* **2001**, *57*, 9199-9225.