



SYNTHESIS OF MALEIC ANHYDRIDE COPOLYMERS BY CONVENTIONAL AND NON-CONVENTIONAL METHODS

I. Popescu, G.C. Chitanu

*"Petru Poni" Institute of Macromolecular Chemistry, Department of Bioactive and Biocompatible Polymers, Iasi, Romania
irinaxpopescu@yahoo.com*

Microwave irradiation can be used as an alternative cleaner heat source in polymer synthesis or polymer chemical modification [1, 2]. Microwave-assisted free radical polymerization of vinyl monomers can bring some advantages compared to classical methods: reaction acceleration, higher yields, sometimes higher polymer molecular mass [2, 3]. Unlike heating with external sources, where the heat comes from the outer environment and is not homogenous, microwaves directly heat up the initiator, monomers and the solvent if a dipole moment exists.

Maleic anhydride copolymerizes easily with a large number of vinyl monomers with electro donor groups when 1:1 alternative copolymers were obtained [4]. When comonomers with bulky substituents were used, the reaction yields were low and sometimes the reaction mixture was not homogenous. To overcome these difficulties, we tried the microwave-assisted copolymerization of maleic anhydride. We synthesized firstly two maleic anhydride copolymers with usual comonomers: vinyl acetate and styrene under microwave irradiation and by classical heating. The copolymers were characterized regarding the composition by conductometric titration, FTIR and ¹H NMR spectra. The molecular mass was determined by viscometric measurements, using the K and a constants form the literature. The results obtained by the two techniques were compared. Then maleic anhydride copolymers with bulky comonomers such as: vinyl-cyclohexane, 2-vinylnaphthalene, and 9-vinyl-carbazole were synthesized under microwave irradiation and by classical heating. The influence of the solvent, of the initiator and of the reaction temperature was investigated aiming to obtain copolymers having the composition close to 1:1 (moles) and the molar mass relatively high. The copolymers were characterized regarding the composition by conductometric titration, FTIR and ¹H NMR spectra and the molecular mass was determined by Gel Permeation Chromatography (PC).



References

1. D. Bogdal, K. Matras, *Polymer chemistry under the action of microwave irradiation*, chapter in *Microwaves in organic synthesis*, ed. by André Loupy, Wiley-VCH Publisher, 2nd ed., **2006**, vol. 2, pp. 653-684.
2. R. Hoogenboom, U. S. Schubert, *Macromol. Rapid Commun.* **2007**, 28, 365-386.
3. H. Stage, A. Greiner, *Macromol. Rapid Commun.* **2007**, 28, 504-508.
4. G. C. Chitanu, I. Popescu, A. Carpov, *Rev. Roum. Chim.*, **2005**, 50 (7-8), 589-599.

Acknowledgement

The financial support of the Romanian National Authority for Scientific Research, PNCD II projects no. 71-122/2007 (MAMINAL) and no. 71-047/2007 (FOTOCOMPLEX) is gratefully acknowledged.