OC-2

MICROWAVE ASSISTED SYNTHESIS OF POLYARYLENE ETHERS

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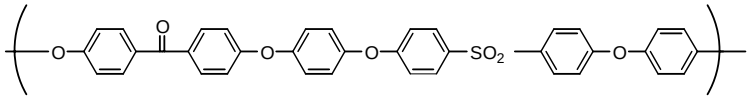
Since its discovery, microwave irradiation effect has been used for heating and drying materials for decades. However, its first use in organic chemistry synthesis only appeared in 1979 [1] and was further investigated in 1986 [2, 3]. Since this period, a tremendous interest has been devoted to assisted microwave synthesis as illustrated by the exponential number of publications and to the wide diversity of organic reactions that are successfully performed [4] (Suzuki coupling, Claisen rearrangements, Nucleophilic Substitutions…). Because of the high yields and great selectivity induced by microwave irradiation, assisted microwave synthesis seems particularly interesting for the preparation of polymers. A recent review [5] reports on the growing interest of such processes for a wide range of polymerization pathways, such as Ring Opening Polymerization, radical polymerization, living radical polymerization, C-C coupling polymerization, or step growth polymerization.

As reported by Loupy et al.[6] assisted microwave ether synthesis via a nucleophilic substitution reaction is particularly efficient.

In this work, microwave assisted aromatic nucleophilic substitution has been used to synthesize high molecular weight poly(aryl ether ketone)s (PAEKs) and poly(arylether sulfone)s (PAESs) in very short reaction times and through a highly simplified process towards the conventional procedure. The influence of different parameters, (microwave power, solvent nature, or reaction time) were studied in order to optimize the polymerization conditions and to synthesize high molecular weight polymers. The macromolecules thus obtained were characterized and compared to their analogues synthesized by thermal polycondensation.

Based on a new biphenol monomer, a rigorous alternated poly(ether ketone – ether sulfone) copolymer bearing interesting properties was synthesized.



An in-depth study of the microstructure of some thermal and microwave-assisted copolymers gave some clues on the possible mechanisms which could occur during the polymerization.

References

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