

The synthesis of poly(methyl methacrylate) containing crown ether units using macroazoinitiators and its cation binding properties

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SUMMARY

Poly(methyl methacrylate) having crown ether units was prepared by using polyazoamides as initiators. The complexing properties of the obtained polymers towards metals were reported. The crown ether content of the polymer had influence upon the complexing capability.

INTRODUCTION

Crown ethers which have the ability to bind metal cations in their cavities are of increasing interest [1,2]. The incorporation of crown ether units can induce complexing in the polymer. A number of studies on combining crown ether structures with polymers have been reported [3-14]. Recently we have synthesized a macroazoinitiator for the synthesis of polymers with crown ether units by solution [15] and interfacial [16] polycondensation reaction. The latter provided complexation of the crown ether moiety before the polymer was synthesized, and the crown ether complex probably acted also as a phase transfer catalyst between water and the organic phase. The resulting polyamide is a useful initiator for free radical polymerization. More recently, we have prepared copolyamides containing crown ether moieties and the desired amount of thermolabile azo groups [17].

Here we wish to report the utilization of polyazoamides as free radical initiator by which poly(methyl methacrylate) (PMMA) having various segment length of the crown ether moiety can be prepared. The extraction of some metal cations by the resultant PMMA was also examined.

EXPERIMENTAL

Materials and Instruments

The preparation of polyazoamides was described in detail previously [17]. Methyl methacrylate (MMA) was washed with 5 % aqueous NaOH and water, dried over CaCl_2 and finally distilled over CaH_2 under reduced pressure.

$^1\text{H-NMR}$ spectra were recorded on a Bruker NMR (200 MHz) in CDCl_3 with TMS as internal standard. UV spectra were obtained with a Shimadzu UV 150-02 instrument. GPC chromatograms were obtained from a Knauer M64 system with methyl ethyl ketone as eluent and a flow rate of 1 ml/min. Molecular weights were calculated according to polystyrene standard samples.

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