

Polymerization of acrylamide initiated by the redox system Ce(IV)-4,4'-azobis (4-cyano pentanol)

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SUMMARY

Acrylamide was polymerized by ceric ion Ce(IV)-4,4'-azobis(4-cyano pentanol)(ACP) redox pair in aqueous nitric acid under nitrogen atmosphere. The rate of polymerization is proportional to $[M]^2$, $[ACP]$ and $[Ce(IV)]^{-1}$. Termination mechanism which was exclusively linear offered one azo group per polymeric chain. The obtained polyacrylamide can be used as a water soluble initiator for vinyl polymerization.

INTRODUCTION

Synthesis of block copolymers has recently attracted a revitalized interest in connection with the demand of novel materials possessing specific physical properties. Beside the various synthetic methods, polymeric azo initiators have been successfully used for the synthesis of block copolymers via a radical mechanism (1). They can be prepared from low molar-mass azo initiators by means of condensation (2-5), cationic (6-8) and anionic polymerization (9,10) processes without any loss of the azo function.

It is well known that certain ceric salts such as the nitrate and sulfate form very effective redox systems in the presence of organic reducing agents such as alcohols (11), aldehydes (12), and amines (13). Application of this technique to polymers with pendant reducing groups, namely alcholic hydroxyl groups, provides a versatile method for graft polymerization of suitable monomers (14).

In the present work, cerium ion was used in conjunction with 4,4'-azobis (4-cyano pentanol) (ACP) to initiate a polymerization of acrylamide (AAm). The resulting polymer possesses central thermosensitive azo function.

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