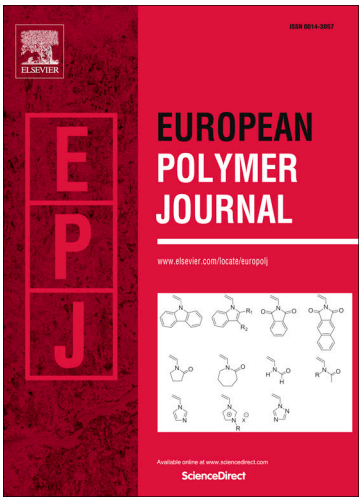

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Effect of Ionic Liquids on the RAFT Polymerization of Butyl Methacrylate

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ABSTRACT

Ionic liquids (IL) were used as solvents to study the RAFT polymerization of butyl methacrylate. The ILs offered a significant increase in the rate of polymerization and the RAFT agents contributed to a tailor-made polymer with controlled molar mass and narrow dispersity (Đ). The IL used in the polymer synthesis was successfully recovered and reused, demonstrating the recyclability of the IL solvent. Also, ILs were found to increase the rate of polymerization in binary solvent systems irrespective of its miscibility with the monomer. GPC and NMR analyses were used to determine the molar mass and RAFT end groups in the synthesized polymers. The synthesized poly (butyl methacrylate) (PBMA) with RAFT end group was used as a macro-RAFT to polymerize methyl methacrylate (MMA) to prepare diblock copolymer, PBMA-*block*-PMMA, successfully in IL as a solvent.

***Keywords*:** ionic liquid, binary solvents, solvent recycling, kinetics, RAFT, butyl methacrylate

INTRODUCTION

Exploring new processes having green and sustainable aspects has been one of the themes in the contemporary research in materials science. According to Anastas [1], these processes especially which are used in organic synthesis should use solvents which are environmentally non-hazardous, non-polluting and safe to handle. Importantly, the solvents should be easily recycled and reused without losing its efficiency. Also they should not produce unwanted by-products during the reaction. Ionic liquids are viable candidates for such solvents as they are non-flammable, thermally and chemically stable. They have negligible or no vapour pressure. Hence, they have no volatile organic content (VOC). Importantly they can be recovered, recycled and reused without any loss in their efficacy and efficiency. This explains the exponential increase in the research activities with ionic liquids (IL) as alternate 'green' solvents for polymer synthesis in the last decade[2,3]. ILs are asymmetric salts of cations and anions which remain in the liquid