HIGH MOLECULAR WEIGHT POLYSTYRENE PARTICLES BY CATIONIC MINIEMULSION POLYMERIZATION CATALYZED BY AN IRON-CONTAINING IMIDAZOLIUM-BASED IONIC LIQUID

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Cationic styrene polymerizations in aqueous media were conducted using the miniemulsion polymerization technique with the ionic liquid 1-N-butyl-3-N-methylimidazolium heptachloro diferrate (BMI.Fe_2Cl_7) as catalyst, hexadecyltrimethylammonium bromide (CTAB) as surfactant and hexadecane as costabilizer. The ionic liquid was effective to initiate styrene miniemulsion polymerization at a BMI.Fe_2Cl_7:styrene molar ratios as low as 1:1000. Increasing the reaction temperature from 70 °C to 90 °C led to an increase in both, conversion and molecular weight. And polystyrene with much higher molecular weight (viscosity average molecular weights of up to 2231 kDa) than those usually obtained in cationic polymerizations was produced. Furthermore, while particle sizes remained almost constant around 150 nm during polymerizations, an almost linear increase of conversion with reaction time was observed. In addition, molecular weight increased steadily with conversion approaching the behavior of living cationic polymerization.

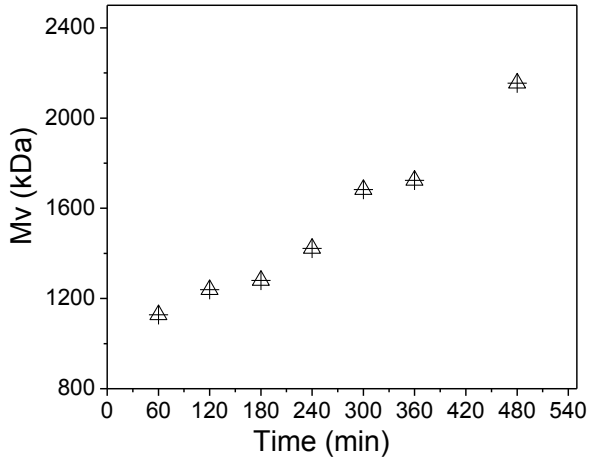

Figure 1 – Molecular weight increase (Mv) during styrene miniemulsion polymerization of styrene using BMI.Fe_2Cl_7 as catalyst.

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