A Green Synthesis and Polymerization of N-alkyl Methacrylamide Monomers with new chemical approach

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Abstract. In the present work we have developed a novel procedure to synthesize Poly Nalkyl Methacrylamide by using a heterogeneous silica catalyst that can effectively catalyzed amide synthesis and anionic polymerization, without production of toxic by-products. The polymerization of N-alkyl Methacrylamide monomers formulated as Methacrylamide, 1,4bis(Methacryloyl)Piperazine, N-Methacryloylmorpholine and N-Phenylmethacrylamide are carried out using an environmentally friendly catalyst a proton exchanged montmorillonite clay, in an ice bath. We have synthesized the monomers by the condensation of primary amine ammonia and aniline or heterocyclic secondary amines such as piperazine and morpholine with methacrylic anhydride catalyzed by a green catalyst "Maghnite H⁺" in bulk at room temperature by replacing a toxic reactant acryloyl chloride and triethylamine which are using in previously published studies.

This new approach is even more interesting since this synthesis is carried out in bulk at 0 °C for 2 hours, obtaining a better yield around 85% and selectivity to the product 100%.

The Poly (N-alkyl methacrylamide) structure are characterized and confirmed by Infrared Spectroscopy (FTIR), ¹H nuclear magnetic resonance (NMR) spectroscopy and Thermal properties of the polymers were determined using thermogravimetric analysis (TGA).

Keywords: Green synthesis; Montmorillonite clay; N-Alkylmethacrylamide; anionic polymerization; Methacrylic anhydride.

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