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Effect of several parameters on the kinetic of polymerization of hydroxyethyl acrylate (HEA) induced by visible light

Radiation curing technologies provide a number of economic advantages over the usual thermal operation like: rapid through cure, low energy requirements, room temperature treatment, non-polluting, solvent-free formulations and low costs [1]. One of its applications is the light induced polymerization which has attracted great interest. Most research work into visible light-initiated photo-polymerization has focused on free-radical systems based primarily upon acrylates and methacrylates. For these systems, the activated photoinitiators are usually formed by two components as, for example, a dye and an amine [2]. Recently, the interest in the phenothiazinium dyes as photosensitiser of vinylic polymerization [3,4], has significantly increased due to their visible-light absorptivity. Among them ; the methylene blue (MB) which is a phenothiazinium compound that presents a planar heterocyclic aromatic structure, being characterized spectroscopically by an intense electronic absorption band in the red spectral region (~664 nm). The photo-polymerizable system used in this contribution is based on hydroxy ethyl acrylate monomer, noted HEA using the methylene blue (MB) as a sensitizer dye and an amine as co-initiator. The parameters effects on the polymerization kinetic were experimentally investigated such as dye and co-initiators concentrations, pH of the solution and the light intensity. The polymerization kinetic under visible light was studied using quantitative Fourier Transform Infrared spectroscopy (FTIR). Interestenglly, the structure of the obtained material is considerably depended on these experimental parametrs and a very high final conversion of monomers can be reached.

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Preferred topic

Gels and nanoparticles

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