

Photopolymerization of Dimethacrylamide with (Meth)acrylates

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Abstract : A photopolymerizable dimethacrylamide was synthesized and copolymerized with the selected (meth)acrylates. The polymerization rate, degree of conversion, gel time, and compressive strength of the formed neat resins were investigated. The results show that in situ photo-polymerization of the synthesized dimethacrylamide with comonomers having an electron-withdrawing and/or acrylate group dramatically increased the polymerization rate, degree of conversion, and compressive strength. On the other hand, an electron-donating group on either carbon-carbon double bond or the ester linkage slowed down the polymerization. In contrast, the triethylene glycol dimethacrylate-based system did not show a clear pattern. Both strong hydrogen-bonding between (meth)acrylamide and organic acid groups may be responsible for higher compressive strengths. Within the limitation of this study, the photo-polymerization of dimethacrylamide can be greatly accelerated by copolymerization with monomers having electron-withdrawing and/or acrylate groups. The monomers with methacrylate group can significantly reduce the polymerization rate and degree of conversion.

Keywords : photopolymerization, dimethacrylamide, the degree of conversion, compressive strength

Conference Title : ICABB 2018 : International Conference on Advanced Biomedical and Bioinformatics

Conference Location : Prague, Czechia

Conference Dates : September 03-04, 2018