

EFFECT OF MOLECULAR WEIGHT OF CROSS-LINKABLE N-ETHYLENE GLYCOL DIACRYLATES ON THE GELATION OF ACRYLIC ACID-BASED POLYMERIC HYDROGELS

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The gelation characteristics of acrylic acid-based hydrogels were investigated using real time *in-situ* photo-crosslinking and rheology techniques. The materials investigated were assembled on the basis of monomeric acrylic acid and a range of cross-linkable n-ethylene glycol diacrylate compounds, in a standard solution of poly(acrylamide) of known molecular weight. The gel-time and post-gelation characteristics of the incipient gels and the fully formed hydrogels were compared. The gel point and gelation times were established using the Winter-Chambon criteria. Convergence of $\tan \delta$ was observed in all cases, such that G' and G'' were $\sim \omega^n$. At the incipient gel state, the critical relaxation exponents (n) were all greater than $\frac{1}{2}$. The relaxation exponents ranged from 0.59 to 0.81. The gel-time stiffness (S) steadily increased with an increase in the molecular weight of the n-ethylene glycol diacrylates, while fractal dimensions were decreasing (lesser packed structures) at the gel point. Gel stiffness was found to increase with an increase in the molecular weight of the n-ethylene glycol diacrylate compounds. Mesh sizes of the network clusters and the crosslinking reaction mechanisms were largely invariant of the molecular weight of the n-ethylene glycol diacrylates.