

Monitoring the gelation of polyacrylamide–sodium alginate composite by fluorescence technique

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Polyacrylamide (PAAm)–sodium alginate (SA) composite was prepared with different amounts of SA varying in the range between 0.06% and 2% (w/v). The PAAm–SA composite was characterized by the steady-state fluorescence technique. Pyranine was added as a fluoroprobe for monitoring the polymerization. It was observed that pyranine molecules bind to AAm and SA chains upon the initiation of the polymerization. Thus, the fluorescence spectra of the bonded pyranines shift to the shorter wavelengths. Fluorescence spectra from the bonded pyranines allowed us to monitor the sol–gel phase transition, and to test the universality of the sol–gel transition as a function of SA contents. Observations around the critical point show that the gel fraction exponent, β , and the weight average degree of polymerization exponent, γ , agreed with the percolation result for ($<0.25\%$ (w/v)) SA contents. However, classical results were produced at ($<2\%$ (w/v)) SA contents.

Keywords: sodium alginate; acrylamide; universality; critical phenomena; fluorescence