

Fractals and Gels

Abstract

Most gels possess self-similarity and fractal dimension by presenting fractal behavior during gel formation and swelling. Here we first present a short description of fractals found in nature and some experimental observations related to gels. Photon scattering method was performed to monitor the free radical crosslinking copolymerization (FCC) of acrylamide (AAm) in the presence of N,N-methylenebis (acrylamide) (Bis) in time. FCC experiments were done with various Bis contents to create fractal like network structures in PAAm gels. After drying, these gels were used in swelling experiments when the PAAm gels were immersed in water. Fractal dimension during gelation and swelling processes were measured and found to be increased as gelation and swelling times were increased. Sol–gel and gel–sol transitions in reversible bio gels, like K-carrageenan-water systems with various carrageenan contents were studied to produce fractal dimensions during gelation. These gels were also used in swelling experiments, where the gels were immersed in water. Fractal dimension was found to be increased during gelation, as gelation time was increased. On the other hand fractal dimension decreased during swelling as the swelling time was increased.

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