

The water uptake of poly (tetrahydrofurfuryl methacrylate)

P. D. Riggs, M. Braden, D. A. Tilbrook, H. Swai, R. L. Clarke, M. P. Pate

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Abstract

Poly (tetrahydrofurfuryl methacrylate) possesses some unique characteristics with respect to its biocompatibility and behaviour in water. The water uptake is high (>70%) and very slow (over 3 yr), but the material remains rigid throughout the process. The mechanism behind the uptake is in two stages; an initial Fickian stage, then as the matrix approaches saturation (about 3 wt%) a second clustering mechanism takes over. The rate of uptake of the second stage of the uptake is controlled by creep (or stress relaxation), and the chemical potential driving the uptake from clustering of the furfuryl rings of the polymer. If clustering or the creep is prevented (by appropriate co-polymerisation) the polymer behaves in an ideal, Fickian manner.

Keywords

Water absorption; Diffusion; Creep; Modelling; Poly (tetrahydrofurfuryl methacrylate)