

Permeation of p-nitrophenol through N-isopropylacrylamide-grafted etched-track membrane close to theta-point temperature

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Thermo-responsive poly(N-isopropylacrylamide, NIPAAm) was grafted onto etched-track copolymer films with cylindrical pores of diameter $2.5 \mu\text{m}$ by means of post-polymerization at 60°C for 30 min after pre-irradiation of 30 kGy, using γ -rays from a ^{60}Co source to obtain a layer with a surface graft yield of 0.18 mg/cm^2 . The permeation of p-nitrophenol (PNP) through NIPAAm-grafted etched-track films, when measured at 30°C , was markedly depressed, to $7.12 \times 10^{-5} \text{ cm/min}$, compared with those measured below and above this temperature, e.g. $3.84 \times 10^{-3} \text{ cm/min}$ at 29°C and $2.46 \times 10^{-3} \text{ cm/min}$ at 31°C . This phenomenon can be explained by the existence of a theta-point (θ) temperature at which the hydrophilic interaction between the linear polymer of NIPAAm and water apparently disappears, resulting in permeation retardation of the water soluble PNP.