

Drug release from an ensemble of swellable crosslinked polymer particles

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Abstract

This paper presents a new model suitable to describe the drug release from drug delivery systems constituted by an ensemble of drug loaded crosslinked polymer particles. The model accounts for the main factors affecting the drug release such as the particle size distribution, the physical state and the concentration profile of the drug inside the polymeric particles, the viscoelastic properties of the polymer–penetrant system and the dissolution–diffusion properties of the loaded drug. In order to check the validity of the model, release experiments were performed by using crosslinked polyvinyl-pyrrolidone (PVP) particles and two different model drugs, MAP (medroxyprogesterone acetate) and TEM (Temazepam). MAP and TEM were chosen because of their completely different dissolution behaviours in water. In particular, TEM undergoes a phase transition to the crystalline state upon dissolution when it is loaded in the polymeric network in the amorphous state. The comparison with the experimental results confirms that the most important factors determining the drug release kinetics can be properly accounted for.

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