

## **Modeling drug release from solid matrices based on polymeric hydrogels**

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The drug release from matrices made of hydrogels is a complex process which can be divided into the following steps: water diffusion into the matrix from a liquid external phase, the polymer plasticization and swelling by effect of water, drug diffusion into the gel toward the outer medium, and the polymer erosion at the external interface. Such a complex behavior, to our knowledge, was not described by a full model up to now. In this work, the full problem of drug release from polymer (HPMC) based matrices systems was investigated and described. The phenomena, previously observed and quantified experimentally in our laboratory, of water up-take, polymer swelling and erosion, and drug diffusion through the polymer and release in the outer medium were described by transient mass balances in presence of variable coefficient pseudo-diffusion, and the resulting set of differential equations were solved by using finite element methods. The resulting code was found able to describe quantitatively the main features of the observed phenomena, including the tablet size increase and the tablet shape deformation as result of water up-take and polymer erosion.