Mathematical modelling of the release profile of anthraquinone-derived drugs encapsulated on magnetite nanoparticles

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Abstract

The paper describes the kinetics of rhein antitumor drug release from the heparin shell of magnetite nanoparticles, monitored by UV measurements and expressed through a fractal approximation based on Weibull model. A good correlation coefficient between the experimental curve and the Weibull fitted curve was found, pointing that the diffusion mechanism obeys a complex non-Fickian profile, with a large number of degrees of freedom in the phase space. The calculated parameters are in correlation with the fractal dimension, which depends on diffusion order. The chosen fractal mathematical pattern uses a reduced number of approximations with the purpose of simplifying mathematical modeling, which, otherwise, proves to be quite complex.

Keywords: magnetite particles, rhein, heparin, fractal dimension, Weibull law.

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