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Obtainment and Characterization of Nanocomposites for Pharmaceutical Applications

A. P. O. Rodrigues[(1)*], M. I. B. Tavares[(1)] and L. M. Cabral[(2)]

(1) Instituto de Macromoléculas Professora Eloisa Mano, Universidade Federal do Rio de Janeiro, e-mail: paularodrigues@ima.ufrj.br
(2) Faculdade de Farmácia, Universidade Federal do Rio de Janeiro, CCS-Block B/Room 31, 21941-590, Brasil.
* Corresponding author.

Abstract – Many studies use the concept of nanocomposites for pharmaceutical applications, more specifically use as excipients. A nanocomposite PVP - lamellar silicate (organoclay) was prepared by solution in toluene. In this work, a scanning time of reaction was performed using different amplitudes obtained by a sonicator in different proportions of organoclay to characterization through X-ray diffraction (XRD). The analysis suggests the formation of nanocomposites with evidence of exfoliation, a result attributed to the possible disruption caused by different ultrasonic vibrations on the lamellar structure of clay that were able to destabilize the negatively charged lamellae.

INTRODUCTION: The use of nanotechnology in pharmaceutical applications for several different purposes is widely used approach [1,2]. So, considering that montmorillonite (MMT) and its organically modified derivatives, which have lamellar nanostructure that is able to be delaminated with low toxicity, it seemed reasonable to test MMT and its derivatives to prepare new pharmaceutical excipients [3]. The viscogel S4, S7 and B8 are a group of organically modified clays obtained by intercalation of different alkylammonium surfactant salts with lamellar nanometric geometry. Polyvinylpyrrolidone (PVP), Hydroxypropylmethylcellulose (HPMC) and Cellulose are widely used polymeric pharmaceutical excipients [4,5]. **OBJECTIVE:** The major aim of this work is to study a new methodology for obtaining delaminated nanocomposites with modulated pharmaceutical applications. **METHODS:** The delamination process was conducted by solution method with of MMT/organoclay-toluene (1:100). This preparation was homogenized and subjected to a sonicator for 15-45 minutes at different amplitudes of ultrasonic energy (20%, 60%, 100%). Thus the inclusion of PVP, HPMC and Cellulose occurred in the proportions of 2:1, 1:1 and 1:2 at the best clay intercalation result. The system was stirred for 12, 24 and 48 h. The extraction of the solvent was conducted under reduced pressure. The samples were analyzed by IR and X-ray diffraction. **RESULTS**: X-ray diffraction delamination results, showed that the best point was obtained after sonication with high amplitudes for Viscogel S4. It is believed that larger amplitudes of ultrasonic energy are capable of destabilizing the electrostatic links of clay producing an exfoliation design of Viscogel S4. Viscogel B8 and S7 were delaminated by the same experimental conditions. **CONCLUSION:** Through this study it was possible to illustrate the formation of Polymer-Clay exfoliated nanocomposites and synergic interaction of different properties of these pharmaceutical excipients. The exfoliation is probably achieved by the ultrasonic energy provided in the intercalation system and by the additional interaction PVP amide structure and clay lamella.

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