

The objective of this work focuses on the preparation of porous hybrid silicate materials doped with an active ingredient, based on biocompatible components for pharmaceutical applications, as drug delivery systems. The motivation for this study is related to the need to meet the growing demand for more effective drugs. The first point of interest of this study concerns the compounds used which are biocompatible, low-cost, and which are good candidates for the formation of mesostructured materials. The surfactant used was Kolliphor EL (KEL) and the oils were Miglyol 812N (Mig), and Isopropyl Myristate (IM). The active ingredient Ketoprofen (KTP) was chosen as the model molecule for the evaluation of release assays. Finally the HeLa culture, a cancer cells type, were used to assess the toxicity of the prepared carriers. The phases behaviour of KEL/water binary system were studied and described. The different 1- and 2-phase domains were determined and characterized by visual inspection, using polarized light optical microscopy and liquid crystal structures by SAXS. Then, the influence of oil addition in the KEL/water system was studied at 25°C. Ternary phase diagrams were established with Miglyol (Mig) and Isopropyl Myristate (IM). From these Mig and IM-based systems, mesoporous materials were prepared. With optimized synthesis conditions, the mesoporous network was structured in both cases. After that the influence of the addition of a block copolymer, the P123 in the KEL/water system is reported and the phase diagram is presented, showing the synergy of the two surfactants to form micelles and liquid crystals. Then, the effect of the addition of P123 micelles in the Isopropyl Myristate based fine emulsions (Em) is studied to describe the variation in the porosity form the materials obtained with different ratios of Em/P123 micelles. For emulsion (Em)/ P123 micelles proportions less than 50/50, mesoporous silicas with two pore sizes are obtained. When the Em/P123 ratio increases, it is possible to control the porosity of the materials. In the last part the study of the encapsulation of KTP in different systems, its release and the toxicity were explored. Concentrated emulsions as well as hybrid materials based on micellar solutions and Miglyol-based fine emulsions (Em) were selected as drug carriers for the toxicity assays. Release studies were performed with a PbS solution at different pH levels: 7.4; 1.2 and 4.6. The results showed that, under neutral conditions, the KTP released by hybrid materials based on micellar solutions reaches 38% after 24 hours and the pH effect increases the amount of KTP released. Then, the release into a receptor solution with different concentrations of P123 was studied. The results show that the amount of KTP released in the presence of 5% P123, reach 65% after 24 hours. In the last part, the toxicity of doped materials and hybrid systems was assessed. The results show that the silica matrix protects the cells because cell viability is increased, from 64 to almost 80% with hybrid materials.