Effect of hydrothermal treatment on the materials MCM-41 type modified iron for drug delivery.

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Synthesis of MCM-41 having magnetic elements embedded inside has been researched in order to develop very interesting drug-delivery systems. In this work, MCM-41 nanostructured materials modified with iron were synthesized using the direct synthesis method (DI) and a hydrothermal treatment (HT) was applied [1]. Due to that silanol groups can form hydrogen bridge bonds with the carboxyl and carbonyl groups of indomethacin (IN), the silanol groups density on the support was analyzed by IR spectroscopy. Then, the drug was incorporated into both iron modified samples and into the pure MCM-41 and their release profiles were evaluated *"in vitro"* using simulated body fluid as medium. All modified materials have faster profiles than the pure silica matrix. This could be due to the presence of nanospecies of oxides inside channels that might increase the steric diffusion resistance. Thus, the drug could diffuse through the channels of the modified material with less freedom that through those of MCM-41. However, the sample modified with iron by this method with HT have a behavior similar to that of MCM-41 possibly due to the refiner effect of HT on the nanospecies size. In addition, materials with HT have an increased availability of silanol groups capable to interact with the indomethacin. This would explain their high drug adsorption capacity and the slow drug release rate. Then, this solid have good properties of adsorption and release, similar to that of the parent pure MCM-41 and simultaneously their modification with iron nanospecies leads to materials with superparamagnetic behavior.

Table: Experimental data

	MCM-41/IN	**Fe-DI/IN**	**Fe-DI(HT)/IN**
IN Adsorption [%]	76.5	74.56	78.69
Max. Release [%]	62.08	74.96	65.30
Release at 15 min.[%]	12.85	15.48	13.74

Key words: Hydrothermal treatment, MCM-41, drug release, Indomethacin.

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