

Evaluation of pore structural stability of mesoporous titanium silicates

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Since the disclosure of the M41S family of mesoporous molecular sieves, in 1992, much interest has been devoted to metal containing samples due to the high potential application as heterogeneous catalysts. In the face of the remarkable success of microporous titanium silicates (TS-1, TS-2, Ti-beta), in selective oxidation reactions, the incorporation of titanium into ordered mesoporous silicate structures, such as MCM-41 and SBA-15, became important because it opened new possibilities for conversion of bulky substrates, whose diffusion is limited by the small pore apertures of those microporous materials. It is recognized that thermal, mechanical and hydrothermal stability are crucial properties for their potential applications.

In previous work, we have shown that a direct synthesis procedure at ambient temperature and pressure can provide well structured Ti-MCM-41 materials which present interesting selectivity and conversions for cyclohexene epoxidation [1] and also high thermal and mechanical stability [2] as well as stability in the presence of water vapour [3]. Therefore one of the purposes of the work presented here is to complement the stability features by studying the hydrothermal resistance of the Ti-MCM-41 materials prepared by the same procedure. A similar study of Ti-SBA-15 materials, synthesised by conventional procedures, will also be presented and the results compared with those of Ti-MCM-41 materials. The metal content was the main parameter considered. The pore structural alterations were evaluated by characterising by X-ray diffraction and nitrogen adsorption at 77K before and after the materials were submitted to increasing temperature, increasing unidirectional pressure or after 12h in boiling water under static conditions.

[1] C. Galacho, M.M.L. Ribeiro Carrott, P.J.M. Carrott, *Micropor. Mesopor. Mater.* 100 (2007) 312.

[2] C. Galacho, M.M.L. Ribeiro Carrott, P.J.M. Carrott, *Micropor. Mesopor. Mater.* Doi:10.1016/j.micromeso.2007.04.010.

[3] M.M.L. Ribeiro Carrott, C. Galacho, F.L. Conceição, P.J.M. Carrott, *Stud. Surf. Sci. Catal.*, 160 (2006) 567.

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