

Ordered Mesoporous Titanosilicate Materials Prepared at Room Temperature: Synthesis Conditions vs Structural Properties

C. Galacho^a, M.M.L. Ribeiro Carrott^b, P.J.M. Carrott^c, J.M. Valente Nabais^d

Universidade de Évora, Centro de Química de Évora & Departamento de Química
Rua Romão Ramalho nº59, 7000-671 Évora, Portugal

^apcg@uevora.pt, ^bmanrc@uevora.pt, ^cpeter@uevora.pt, ^dajvn@uevora.pt

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Abstract. Mesoporous titanosilicates were directly synthesised at ambient temperature and pressure, considering a wide range of metal content ($0.01 \leq \text{Ti/Si} \leq 0.5$) and using cationic surfactants of different alkyl chain length. It is shown that the use of tetradecyl-, hexadecyl- and octadecyltrimethylammonium bromide as structure-directing agents provide higher quality Ti-MCM-41 materials, than those prepared with surfactants of shorter alkyl chain. The pore volume and surface areas are gradually reduced by the increase of Ti content but up to $\text{Ti/Si}=0.02$ the alterations in the pore structural properties are negligible as compared with pure silica grades, becoming more noticeable for $\text{Ti/Si} \geq 0.1$. Nevertheless, for $\text{Ti/Si}=0.1$ the directly synthesised materials still have high pore volumes as well as high regularity and uniformity of the hexagonal pore array, with superior pore structural properties to those of materials prepared by post synthesis deposition of titanium on silica MCM-41, which did not provide a valid alternative for minimising the disruptive effect of high metal content on the hexagonal porous structure.