

Influence of the precursor (nature and amount) on the morphology of MoO₃ crystallites supported on silica

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Abstract

The influence of the nature of the precursor and the amount used is investigated in the preparation of MoO₃ catalysts supported on a mesoporous silica by a wet impregnation method. Four precursors are compared: ammonium heptamolybdate, peroxyopolymolybdate, a citrate complex of Mo and an oxalate complex of Mo. The MoO₃ loading is adjusted between 0 and 2 theoretical monolayers of MoO₃. Characterization of the samples was performed by N₂ physisorption, X-ray diffraction and scanning electron microscopy with as main objective the evaluation of the dispersion of MoO₃ on the silica and of the morphology of MoO₃ crystallites eventually obtained. At low loadings, MoO₃ appears as amorphous material remaining at the outer surface of the silica. At high loadings, MoO₃ appears as molybdate crystals. The loading above which MoO₃ crystals are obtained depends on the precursor used. The morphology of MoO₃ crystals, when obtained, also depends on the precursor used. Isotropic crystals are obtained with Mo oxalate and peroxyopolymolybdate while Mo citrate leads to crystals with largely developed basal faces. Ammonium heptamolybdate leads to crystals with an intermediate morphology. Our results thus show that changing the nature and the amount of precursor used to impregnate MoO₃ on silica offers a promising possibility to adjust the morphology and, to some extent, the dispersion of MoO₃ crystals at the surface of the support.

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