

Mesoporous alumina obtained in the presence of different surfactants

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The organized mesoporous alumina has many environmental applications as catalysts support, adsorption or separation material. This type of applications requires materials with well-controlled textural properties [1,2]. Our work has been focus on the obtaining of mesoporous alumina with large surface area and narrow pores size distribution by sol-gel method in the presence of different surfactants. We have studied the synthesis conditions for mesoporous alumina formation from aluminum isopropoxide in the presence of anionic (lauric and stearic acids) or cationic surfactants (cetyltrimethylammonium bromide, CTAB), respectively. To establish the thermal treatment conditions, alumina precursors were investigated by thermal analysis (DSC-TG). The crystalline phase evolution was studied by X-ray diffraction (XRD). Alumina samples were further investigated by FTIR spectroscopy, adsorption-desorption isotherms and transmission electron microscopy (TEM).

The alumina precursors were calcined at different temperatures and durations to obtain mesoporous γ -alumina. The XRD data show that the alumina samples obtained at 500 °C or 550 °C in the presence of carboxylic acid have amorphous walls, whereas the samples prepared at 500 °C, in the presence of CTAB, in alkaline medium are crystalline with γ -alumina structure.

It is observed that a high concentration of carboxylic acid determines a decrease of the specific surface area values. We have prepared mesoporous γ -alumina with specific surface area values in the range of 200 - 450 m²/g and the best results have been obtained when stearic acid has been used as template agent.

References

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