TITANIA-MODIFED SBA-16 APPLIED TO OXIDATIVE DESULFURATION OF DBT

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Recent results show that Ti-containing molecular sieves exhibit good catalytic reactivity in the oxidation of sulfide, mercaptan, thiophene and derivatives [1]. In this work, we describe the preparation and characterization of new mesoporous catalytic materials based on Ti-containing SBA-16. The aim of the present work is to study the effect of the preparation method of titania-modified SBA-16 (characteristics of the active species Ti and/or TiO_2) on the performance in the ODS of DBT with H_2O_2 and acetonitrile as solvent at mild conditions.

Oxidative desulfurization (ODS) has received much attention as an alternative new method for the deep desulfurization of light oils because of its attractive features, such lower temperature, mild pressure conditions and lower cost of operation [1,2]. Oxidation of organosulfur compounds leads to the formation of their sulfoxides/sulfones, which are highly polar and thus can be easily removed by extraction into polar solvents or by adsorption. The ODS process is conducted under mild conditions (1 atm and 60–90°C), whereas the conventional HDS process, pressures higher than 30 bar and temperatures from 300 to 380°C are commonly used.

Three different catalysts were synthesized: TiO_2/SBA-16, Ti-SBA-16 and TiO_2 as reference. The oxidation takes place therein producing the corresponding sulfone (+98%). Additionally, the experiments show clear evidence that the nature of the Ti catalyst significantly affects the sulfone yield. The catalytic results reveal high conversions and high yields of sulfones, improving on the behavior displayed by pure anatase. Larger pore volume and pore size of SBA-16 to facilitate DBT mass transfer and therefore the rate of DBT. It facilitates DBT sulfones desorption as well. It is estimated that highly dispersed TiO_2 in the SBA support is the most active site for DBT oxidation. The influence of catalyst concentration, initial DBT concentrations and reaction temperature on DBT oxidation was examined in detail.

Keywords: Titanium containing SBA-16; ODS; activation energy; DBT.

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