Mesoporous WO_3/KIT-6: Highly active catalyst for the oxidative desulfurization of aromatic sulfur compounds

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Mesoporous KIT-6 supported WO_3 catalysts (with various WO_3 loadings of 5, 10, 15and 20wt%) were synthesized by incipient impregnation method and used as the catalysts for oxidative desulfurization of model oil. The materials were well-characterized by XRD, N_2 -adsorption, SEM, TEM, H_2-TPR and Raman spectroscopy. The results show that the WO_3/KIT-6 catalyst with a WO_3 content up to 10wt% can well dispersed on the support of mesoporous KIT-6, and from 15wt%, crystalline WO_3 was generated. The application of these catalysts to the oxidative desulfurization (ODS) of aromatic sulfur compounds (dibenzothiophene, 4,6-dimethyldibenzothiophene, benzothiophene) with H_2O_2 was reported. The effects of reaction temperature, catalyst amount, and H_2O_2/S ratio on the desulfurization of DBT over 10wt% WO_3/KIT-6 were studied in detail. And when the temperature increased to 70°C, treatment of BT, DBT, 4,6-DMDBT with 10wt% WO_3/KIT-6 showed 100% removal of sulfur compounds in 2h. In addition, the catalyst could be recycled several times with only a slight reduction in catalytic activity after regenerated by calcination.