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NIMO HDS CATALYSTS SUPPORTED ON NB MODIFIED MESOPOROUS SBA-15 AND HMS: EFFECT OF THIOGLYCOLIC ACID ADDITION

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The supports Nb-SBA and Nb-HMS were precipitated from solutions of tetraethyl orthosilicate and ammonium niobium oxalate with the assistance of surfactants to achieve molar Si/Nb ratio 40. Ammonium heptamolybdate, nickel nitrate and thioglycolic acid solutions were investigated for impregnation of the supports to prepare hydrodesulfurization (HDS) catalysts containing 2.2 wt. % Ni and 12 wt. % Mo with the molar ratio Ni/Mo = 0.3. The supports and NiMo catalysts were characterized by N₂ physisorption, small- and wide-angle X-ray diffraction, UV-Vis DRS, XPS and SEM. Activity of catalyst was determined in HDS reactions of thiophene and 1-benzothiophene at 350°C and cracking reaction of cumene (test of acidity). It was ascertained from the N₂ physisorption and X-ray diffraction measurements that Nb-SBA exhibited clearly pronounced mesoporous character while Nb-HMS was more microporous with broader pore-size distribution in the mesoporous regions. Deposition of the NiMo did not change the support texture significantly. It was furthermore found that the deposition of TGA (the molar ratio of TGA/Mo was 4.0.) simultaneously with Ni and Mo precursors on both supports significantly increased the catalytic activity. In particular, TGA positively acted onto Nb-SBA-supported NiMos independently on the preparation step, in which it had been applied. Its effect on the HDS activity was at least 2-fold. TGA-coimpregnated NiMo/Nb-SBA thus exhibited about the same integral HDS activity as the highly active industrial reference NiMo Al₂O₃-supported catalyst KF846.

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