A Novel CeO2-WOx-TiO2 Catalyst for Oxidative Desulfurization of Model Fuel Oil

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Abstract : A series of ternary compound catalyst with nanocomposites of ceria, tungsten trioxide and titania (CeO2-WOx-TiO2) with different WOx mole fraction (10, 20, 30, 40) have been synthesized by sol-gel method. These nanocomposite catalysts were used for oxidative extractive desulfurization of model fuel oil, which were composed of dibenzothiophene (DBT) dissolved in toluene. The 30% hydrogen peroxide, H2O2 was used as oxidant and acetonitrile as extractant. These catalysts were characterized by SEM-EDS to determine the morphology. Catalytic oxidation results show that the catalysts have high selectivity in refractory fuel oil with organo sulfur contents. The oxidative removal of DBT increases as the HPW content increases. The nanocomposites CeO2-WOx-TiO2 also shows high selectivity for DBT oxidation in the DBT–toluene acetonitrile system. The catalytic oxidative desulfurization ratio of model fuel reached to 100% with nanocomposites CeO2-WOx-TiO2 (35-30-35) mol percent catalyst nanocomposition under 333 K in 30 minutes.

Keywords : ceria, oxidative desulfurization, titania, phosphotungstic acid
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