Production of Elemental Sulfur by the Oxidation of Hydrogen Sulfide over CeO_2 -TiO_2 Catalysts Synthesized by Sol-Gel Method

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Hydrogen sulfide (H_2S), which is highly odorous and toxic, accompanies fuels in oil and gas refinery processes. Since, increasing environmental concerns have been issued, reducing H_2S along with SO_2 became one of the leading issues in emission reduction. TiO_2 has been considered as a good catalyst and support in selective oxidation of hydrogen sulfide. On the other hand, CeO_2 has good redox property and high mobility of capping oxygen. Sol-gel method for preparation of the catalyst improved the catalytic activity compare to other methods. In the present work, CeO_2 -TiO_2 catalysts were synthesized by using sol-gel method, and their catalytic performance has been investigated for the selective oxidation of H_2S to elemental sulfur. The obtained catalysts were characterized by XRD, BET, and XPS. CeO_2 -TiO_2 catalysts with the higher proportion of TiO_2 show very good conversion of H_2S without any considerable emission of SO_2. Conversion of hydrogen sulfide decreased with the increase of CeO_2 content. Catalysts with more Ce^{3+}/Ce^{4+} showed higher reactivity, since Ce^{3+} can increase the vacancies and the unsaturated chemical bonds on the surface.