

Catalytic Performance of Niobium Oxide Supported on Iron-Pillared Monmorillonite Clay for Selective Oxidation of Hydrogen Sulfide (H₂S)

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Purification of natural gas and hydrotreatment of crude oil fractions and the steel smelting process in various industries have produced large amounts of highly poisonous hydrogen sulfide (H₂S). For many years, most of H₂S in refineries and smelt plants have been removed by converting it into elemental sulfur by Claus process. However, the remaining 3-5 % H₂S arise SO_x emission problem during the incineration. One approach is the selective catalytic oxidation of H₂S to ammonium thiosulfate (ATS) and elemental sulfur, which we have been reported in our previous works. Here, we synthesized the Nb₂O₅/Fe-PILC catalysts and studied the catalytic activity for the selective oxidation of H₂S. The synthesized catalysts were characterized by XRD, BET, Raman, NH₃-TPD, H₂-TPR and XPS. It showed over 90% conversion of hydrogen sulfide to elemental sulfur. 2 wt. % Nb₂O₅/Fe-PILC showed the highest H₂S conversion among the Nb₂O₅/Fe-PILC catalysts tested in this work. For the more effective understanding of reaction mechanism, the distribution of solid production of solid products (S and ATS) was also discussed.