Effect of vanadia on zirconia-pillared clay for the selective catalytic oxidation of hydrogen sulfide

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Pillared interlayered clays or pillared clays (PILCs) are two-dimensional zeolite-like materials prepared by exchanging the charge-compensating cations between the clay layer with large inorganic cations which are polymeric or oligomeric hydroxy cations formed by hydrolysis of metal oxides or salts. Upon heating, the metal hydroxy cations undergo dehydration and dehydroxylation, forming stable metal oxide clusters which act as pillars that maintain separation between the silicate layers and create interlayer space of molecular dimensions. In this study, a series of vanadia-loaded zirconia-pillared clays (V/Zr-PILCs) with various amounts of vanadia were prepared and characterized using X-ray diffraction (XRD), surface area-pore volume measurements, chemical analysis, X-ray photoelectron spectroscopy (XPS), ^{51}V spin-echo NMR and temperature-programmed desorption of ammonia (NH_3-TPD). V/Zr-PILCs exhibited very good catalytic activity towards H_2S oxidation at temperature ranging from 220-300 ^{o}C without any considerable SO_2 emission.