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Natural Fe-containing kaolinites in reaction of hydrogen sulphide photocatalytic decomposition into hydrogen and sulfur

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In this work we examined the photocatalytic decomposition of hydrogen sulfide on Fe₂O₃ and TiO₂-containing natural materials - kaolinites under UV irradiation. As the initial materials were taken kaolinite clays of Kazakhstan deposits (N° 1 and N° 2). The process was studied in the quartz reactor at the temperature of 40 - 800C. The source of UV radiation was a mercury UV lamp power of 100 watts. Catalysts was treated preliminary thermal activation in the stream of hydrogen sulfide at 500°C for 2 hours. The catalysts were tested by methods: electron microprobe analysis («Superprobe -733», JEOL), XRD (DRON 4 * 0.7 Cu K_a -irradiation), BET by low temperature nitrogen adsorption, Mössbauer and EPR spectroscopy, electron microscopy (TEM). It is shown that the samples N° 1 and N° 2 (49.1 and 92.1 m² / g), pore volume (0.119 and 0.287 cm³ / g) and their size distribution were determined. It is shown that the sample N° 2 is more active than sample N° 1 that is accounted by high content of iron and titanium oxides and greater specific surface. In case of H₂S low concentrations in the gas mixture (3 and 6%) the catalyst decomposed with 100% H₂S conversion to H2 and S indefinitely long time at the space velocities of 510 - 530 h⁻¹. When the concentration of H₂S is observed on the sample with high content of titanium and iron oxides at space velocities 311 - 320 h⁻¹. It was suggested that the active sites of the hydrogen sulphide decomposition are reduced forms of iron and titanium based on the results of Mössbauer, EPR spectroscopy and electron microscopy.

Biography

N.A. Zakarina has completed her candidate degree at the age 27 years after graduating Moscow state University and degree of doctor of chemical sciences from Institute of Organic Catalysis and Electrochemistry. She is Prof; Doctor of chemical Sciences and the Head of oil refining catalysts laboratory of D.V. Sokolsky Institute of organic catalysis and electrochemistry. She has published more than 300 papers in reputed journals.