PREPARATION OF SILICA- AND ALUMINA-SUPPORTED IRON-CONTAINING CATALYSTS FOR SULFUR RECOVERY PROCESSES USING $FeSO_4$ AS PRECURSOR

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Silica- and alumina-supported Fe-containing systems are widely employed in the environmentally valuable processes of sulfur recovery from H_2S-containing gases. Silica-supported Fe-containing systems are the commercial catalysts for selective oxidation of hydrogen sulfide to sulfur in SUPERCLAUS® process [1]. Stability of these catalysts against sulfidation is of special significance, as the formation of FeS_2 under the reaction conditions decreases the selectivity towards sulfur [2, 3]. Alumina-supported Fe-containing systems are used as protective bed in Claus reactor being responsible for the conversion of oxygen and the avoidance of the formation of bulk sulfates in the underlying bed of the Claus alumina catalyst.

The aim of this study is to investigate the peculiarities of utilization of iron(II) sulfate, that is a by-product of the steel or titanium dioxide production processes, as precoursor for the catalyst production for sulfur recovery processes.

The transformation of Fe-containing species during the preparation and testing of Fe-containing alumina and silica-supported catalysts prepared using the iron(II) sulfate precursor have been studied by means of Mossbauer spectroscopy and XPS. It was disclosed that the nature of the support used affects strongly the structure of iron species due to the difference in their acid-base surface properties. The influence of the calcinations temperature on the catalytic properties in hydrogen sulfide oxidation reactions and sulfidation behavior of Fe-containing catalysts have been investigated. The results obtained let us to suggest the approaches for the preparation of selective catalysts for hydrogen sulfide oxidation reaction and an efficient protective bed for the alumina catalyst in Claus process using the $FeSO_4$ as precursor.