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High H_2 Production from the Reforming of CH_4 by Hydrogen Sulphide Using Mo-Cr Supported on Heterogeneous Catalysts.

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ABSTRACT

Catalytic steam reforming has been for a long time the principal method for the production of hydrogen. According to this method, hydrogen is generated by the reaction of steam with methane (CH_4) at quite high temperatures from 923 to 1223 K requiring the removal of hydrogen sulphide (H_2S) present in natural gas streams or light hydrocarbons.

Alternative processes for hydrogen production have been studied. A proposed method is the reforming of CH_4 by H_2S. With this process, the removal of H_2S in natural gas streams is no longer necessary and sulfur, usually considered as a strong pollutant on liquid fuels in refineries, is used as a reagent in H_2S form of hydrodesulphurization processes.

This research involved the synthesis of modified SBA-15 support with zirconia dioxide; achieving the mechanical resistance, chemical stability and redox properties of zirconia improving the textural characteristics. Furthermore, lanthanum oxide incorporation in zirconia was carried out allowing increase of its surface area with enhanced thermal stability. The supports were impregnated with molybdenum as active phase and chromium as promoter.

The materials were evaluated in a quartz reactor at range temperatures of 873 – 1123 K, feed molar ratio CH_4:H_2S of 1:12. Synthesized materials were characterized before and after reaction by X-Ray diffraction, nitrogen physisorption, transmission electronic microscopy and thermogravimetry techniques. All techniques confirm the mechanical and thermal stability of the supports and their textural properties.

Molybdenum supported on zirconia-lanthanum catalyst showed better catalytic performance, achieving high selectivity to hydrogen (64%).

Keywords: reforming, hydrogen, modified supports