**The effect of H2S on the selectivity of light alkenes in the Fe-Mn- catalyzed Fischer-Tropsch synthesis**

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**Abstract**

Iron-manganese oxides are prepared using a co-precipitation procedure and studied for the conversion of synthesis gas to light olefins. In particular, the effect of a range of preparation variables is investigated in details. In this investigation, sulfur absorption and effect of sulfur poisoning on Fe-Mn catalysts have been studied. In the Fischer-Tropsch synthesis process, the poisoning of the catalyst is one of the important parameters causing a decrease in the catalyst activity, declaring the sulfur compounds as virulent poisons in this process. In the present investigation, poisoning of Fe-Mn catalysts were performed in a gas circulation system and H2S was injected into a circulation loop. The prepared catalysts were exposed to a mixture of H2S and N2 at about 450 ˚C in the stainless-steel micro reactor via co-precipitation method. H2S was produced by addition of H2SO4 to Na2S.xH2O and this gas was mixed with an inert carrier gas (N2). Comparing the activity and selectivity of fresh and poisoned catalysts, indicates that the selectivity and CO conversion are affected by high-level sulfur adsorbed on the catalysts. The results show that the CO conversion and selectivity with respect to methane production and coke formation were decreased, but the selectivity of light alkenes such as propylene was increased over poisoned catalysts. Characterization of both precursors and calcined catalysts by powder X- ray diffraction (XRD), Brunauer- Emmett-Teller (BET) specific surface area and thermal analysis methods such as Thermal Gravimetric Analysis(TGA) and Differential Scanning Calorimetry (DSC) showed that the poisoning of Fe-Mn catalysts influenced the catalyst structure.

*Keywords***:** Fischer-Tropsch synthesis; Fe-Mn catalysts; Sulfur pretreatment; Sulfur poisoning; Alkene selectivity.