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Entitled

*PARTIAL OXIDATION OF METHANE TO SYNTHESIS GAS OVER Ni/γ-AL₂O₃ CATALYSTS:
THE EFFECT OF THE STRUCTURE AND THE PRE-TREATMENT OF THE SUPPORT ON THE
CATALYSTS' PERFORMANCE*

by

Sheikh Tijan Jobe

Faculty Advisor

Prof. Abbas Khaleel, Department of Chemistry
College of Science

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Abstract

Abundant natural gas is a potential source of more cost-effective energy and its effective utilization can significantly reduce the dependence on petroleum oil. Disadvantages of natural gas as a direct fuel include its low energy density by volume, and high cost of transportation, which resulted in its underutilization as an alternative energy source. Therefore, the conversion of methane to more easily-handled and value-added products is becoming a promising route for natural gas utilization. Compared to steam reforming of methane to syngas, which is the most commercially applied conversion process, partial oxidation is a more cost-effective promising route. While noble metals have been the most active catalysts, Ni-based catalysts are widely studied due to their lower costs. One of the drawbacks of such catalysts is their deactivation due, mainly, to carbon deposition and structural instability during reactions. Therefore, developing modified Ni-based catalysts to overcome these problems is an important objective for the development of commercially attractive catalysts. In the present work, the effect of the alumina support preparation and pre-treatment, and the effect of selected metal dopants on the Ni-support interaction, coke formation, and catalytic activity was studied.

Keywords: partial oxidation of methane, synthesis gas, natural gas conversion, Ni catalysts.