

THESIS

**OXIDATIVE COUPLING OF METHANE TO
C₂-HYDROCARBON ON Na₂WO₄-Mn/SiO₂, RHA,
OR MULLITE SUPPORTS**

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The 5 wt% Na₂WO₄ -2 wt% Mn supported on various supports were prepared by incipient wetness impregnation method for the oxidative coupling of methane (OCM) reaction in a fixed-bed quartz reactor. The synthesis catalysts had three types of supports, Na₂WO₄-Mn/SiO₂, Na₂WO₄-Mn/RHA and Na₂WO₄-Mn/mullite. These catalysts were characterized by XRD, XPS and BET method of nitrogen adsorption-desorption. The XRD pattern indicated that the main crystal phases of metal oxide catalysts on supported silica powder and rice husk ash were Mn₂O₃ and Na₂WO₄, and the one on supported mullite was MnWO₄. From the XPS spectra of Na₂WO₄-Mn/SiO₂, Na₂WO₄-Mn/RHA, and Na₂WO₄-Mn/mullite, the results revealed the information on Na, W and Mn species distributed on the catalyst surface. The specific surface area of the supports and the prepared catalysts were investigated. For catalytic activity testing, Na₂WO₄-Mn/SiO₂ powder gave the highest CH₄ conversion of approximately 61% at the temperature of 800°C in 1 hour and as high as 45% in C₂ selectivity in 3 hours. For Na₂WO₄-Mn/RHA, the highest CH₄ conversion was 39-51% with up to 52% for C₂ selectivity. For Na₂WO₄-Mn/mullite, the highest CH₄ conversion was approximately 57% and its C₂ selectivity of 23%. Although, Na₂WO₄-Mn/SiO₂ powder gave the highest CH₄ conversion and good selectivity, the catalyst was unstable for long time use. However, the supports of RHA and mullite, the results gave good CH₄ conversion but fair C₂ selectivity, its structure after 4 hours use implied that the catalysts could be reused.

Student's signature

Thesis Advisor's signature

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