Efficient dry reforming of methane with CO_2 over magnesium oxide supported nickel and molybdenum catalysts

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Global carbon dioxide concentrations are steadily increasing without any sustainable solution in sight, mainly due to the scale of the emissions. In petrochemical industries many high CO_2 emitting processes are utilized, including steam reforming that generates CO_2 via water-gas shift reaction. Steam reforming is essentially used to generate *syn* gas through the reaction of CH_4 and H_2O. An alternative route for *syn* gas production is via dry reforming, which is a carbon neutral reforming process that helps reduce global warming by simultaneously utilizing two greenhouse gases, namely CO_2 and CH_4. Additionally, it requires no water, making it a lucrative *syn* gas production option for countries of scarce water supply, when compared to steam reforming. Despite these advantages, dry reforming needs to overcome many challenges prior to widespread industrial implementation, mainly on the development of an efficient catalyst. In this study, a new dry reforming catalyst was developed by reducing nickel and then supporting it on MgO substrate having molybdenum as a promoter. The results revealed a conversion yield over 90% with continuous activity over 300 hours without deactivation. In addition, the H_2/CO ratio was near 1, a desired ratio for liquid production via the Fischer Tropsch process.