

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

KL zeolite is the good support for CO₂ reforming of CH₄ due to using Ni/KL catalysts show a high catalytic activity and stability for this reforming.

7 wt%Ni is the suitable amount of metal loading, however, 7%Ni/KL zeolite show slightly decrease in catalytic activity. The higher amount of Ni loading leads to Ni sintering, the lower Ni dispersion and higher Ni particle size.

The stability of the catalyst can be improved by adding some amount of Mg and Ca promoters due to carbon formation are decreased. Decreasing the carbon formation might be the result of high basicity of the catalysts when Mg and Ca are added. The CO₂ adsorption are increased, therefore, the removal of carbon species formed by O_{ads} from dissociative of CO₂ could be increased. However, the catalytic activity are decreased when adding Ca and Mg promoters. Because coverage of Ni active site with the Ca and Mg promoters might occur.

There are two types of carbon formation occurring in CO₂ reforming of CH₄ reaction. One type of carbon can be oxidised at lower temperature (270-400°C). Another type of carbon can be oxidised at higher temperature (480-720°C). The catalyst with lower amount of carbon formation or easy to oxidise of carbon show higher stability.

The KH zeolite was successfully synthesized by sol-gel process using Ludox HS40 colloidal silica and Aluminium Isopropoxide as the precursors. Using this zeolite as the catalyst support shows slightly lower activity than KL zeolite.

5.2 Recommendations

In this work, it was found that adding promoters reduce the catalytic activity. This effect might be the result of the promoters covered Ni active site of catalysts. However, studying the reaction mechanisms in term of kinetic is the recommended to clarify this effect. KL zeolite was found to be a good support for this reforming. So, the improvement of Ni/KL catalyst by adding other promoters and other preparation technique are recommended for studying further.