

CHAPTER V

CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

It can be concluded that the proper amount of Mg incorporated into ceria-zirconia lattices enhanced oxygen mobility in ceria-zirconia mixed oxides resulting in the increasing in methane conversion and H₂ yield of 15Ni/CZM3O compared to those of the other catalysts. Moreover, the incorporation of Mg into ceria-zirconia lattices benefited the catalyst stability due to the interaction between NiO and CZMO support. This resulted in the stable of catalytic performance of Mg-containing catalyst over the 50 hours of time on stream and the original catalytic performances were achieved after regeneration under oxidizing atmosphere. However, this metal-support interaction caused the declining in reducibility resulting in lower in catalytic activity of the Mg-modified catalysts than that of Ni/CZO catalyst.

5.2 Recommendations

The catalytic partial oxidation of methane (CPOM) has a potential for producing the synthesis gas. The improvement in catalytic stability of the nickel supported catalyst is a key factor to broaden this process in commercial scale. In the presence work, the catalytic performances and stability improvement of NiO/CZO by incorporation of Mg into ceria-zirconia lattices were achieved. However, the improvement in both catalytic performances and stability might be enhanced if the Mg could incorporate more in ceria-zirconia structure. In this work, the desired amount of Mg incorporated in ceria-zirconia lattices were not achieved, this might be improved by using the suitable sol-gel agent or adjusting the condition to prepare the ceria-zirconia-magnesia oxides, therefore, finding the suitable preparation of this oxide should be studied.