

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Palladium (Pd) containing catalysts are generally accepted as the most active catalysts commercially available for the oxidation of unsaturated and saturated hydrocarbons with less than five carbon atoms, particularly for methane. Pd/ γ -Al₂O₃ is known as an active catalyst for performing the complete oxidation of hydrocarbons.

For the first part in this study, the catalytic activities of the twenty-one Pd-based catalysts, promoted with Sn, Ti and Zr in mono-, bi- and tri-element systems according to right-angle triangle tertiary diagram supported on γ -Al₂O₃, were investigated 450-650°C. The second part was to synthesize ITQ-21 zeolite, and the third part was to study the effect of mixed support on the combustion activity of the selected leads by mixing 5% ITQ-21 with γ -Al₂O₃.

The result of the first part showed that the 4%Pd, 0.4%Sn and 0.6%Zr supported on γ -Al₂O₃ provided the highest % conversion, which also increased with increasing temperature. However, the conversion decreased with the increase in time-on-stream. The result of the second part showed that the combustion of the eight selected leads tended to decrease, when using the 5% ITQ-21 mixed with γ -Al₂O₃. Among the tested catalysts on the support mixture, the 4%Pd, 0.6%Sn and 0.4%Zr catalysts provided the highest % conversion of around 90.5 % at 650°C. This result might be due to the well dispersion of PdO. The formation of mixed oxide with ITQ-21 would suppress the combustion activity of the catalyst due to the high bond strength between Pd and PdO as reported in a literature. The catalyst needs further characterizations to clearly understand the improvement due to the use of promoters and ITQ-21.