

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In conclusion, it was found that the autothermal steam reforming of acetic acid over 15wt%Ni/Ce_{0.75}Zr_{0.25}O₂ can be achieved at 650°C, oxygen-to-steam ratio at 0.017 with maximum hydrogen yield of 72% and lowest carbon deposition around 8wt%. Increasing the oxygen-to-acetic acid ratio resulted in decreasing hydrogen yield but increasing C-C bond breakage conversion and decreasing carbon deposition. Both Autothermal steam reforming reaction and steam reforming reaction exhibited similar deactivation trends and quite stable for 150 hours. Moreover, autothermal steam reforming required less energy than steam reforming. The carbon deposition on the steam reforming reaction was found to be greater than autothermal reforming; reported at 18.7 and 16.3 wt% respectively.

5.2 Recommendations

- Due to Autothermal steam reforming of acetic acid over 15wt%Ni/Ce_{0.75}Zr_{0.25}O₂ have some amount of carbon deposited so could be improve the catalyst by adding other metals such as Rh which can be reduce the formation of destructive filament carbon due to the high activity and carbon resistance, Mg which can be reduce methane decomposition. -

- Due to carbon formation occur on the upper layer of the catalyst as seen in Figure 5.1. Study on carbon formation and speculated the step of reaction by designing integral reactor for study on the mechanism and order of reaction.

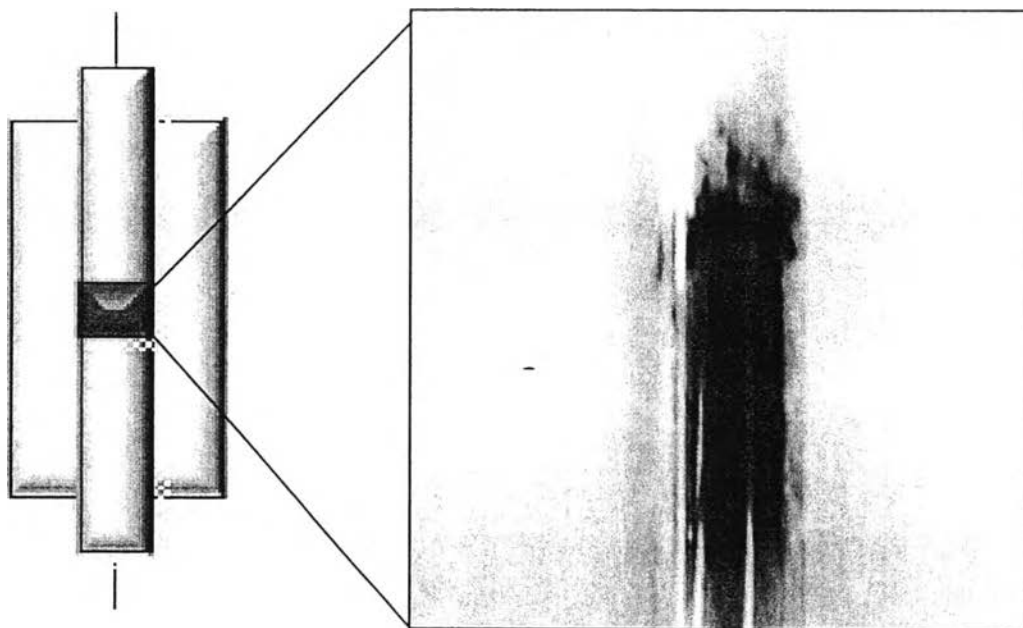


Figure 5.1 Catalyst after activity testing.