CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The highest H_2 production was obtainable for SR but unattainable for POX. H_2 content produced in ATR experiments appeared slightly lower than that under SR conditions. Besides, the products produced at the upper catalyst bed under ATR conditions behaved similar to the catalyst under POX conditions while its lower catalyst bed behaved similar to the catalyst under SR conditions. However, the advantage of ATR process could be viable in lowering carbon formation due to the synergetic effect of H_2O and O_2 feed. In addition, the coke characterization revealed that filamentous carbon was the main type of carbon deposited on spent catalyst whereas amorphous carbon was only found in POX and at the top portion of spent catalyst in ATR. This can be highlighted that part of the acetic acid undergoes exothermic oxidation reactions with all available O_2 at the top catalyst bed while the remaining unconverted acetic acid is then transformed into synthesis gas through endothermic steam reforming reactions down the rest of the catalyst bed.

5.2 Recommendations

This work, coke characterization along the catalyst bed of acetic acid ATR was studied. For a better understanding and strong guidelines for designing of this complex process, the depth studies combining a mechanistic and kinetic analysis should be carried out to confirm that the exothermic and endothermic reactions are existed separately in ATR process along the catalyst bed. Besides, developing in coke-resistant reforming system is a key challenge and the modification of the reactor should be tried for successful application.