



## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

The catalytic synthesis of carbon nanotubes by methane decomposition was systematically investigated. A series of characterization techniques including Raman spectroscopy, TEM, TPO and TGA techniques were employed to characterize the carbon products. The main conclusions of this work are the following.

a) Carbon products mostly consisted of MWNTs when methane is utilized as a feed gas.

b) Carbon products obtained from Co-Mo/SiO<sub>2</sub> and methane mostly are MWNTs, while carbon from Co-Mo/SiO<sub>2</sub> and carbon monoxide mostly consists of SWNTs.

c) The yield of total carbon products is strongly function of the reaction temperature and catalyst formulation.

d) Among the studied catalysts, only Fe-Mo/MgO (2:1 mole ratio) produced SWNTs, however, the selectivity towards SWNT is still very low when compares with Co-Mo/SiO<sub>2</sub> with CO.

#### 5.2 Recommendations

Study the effect of reaction time, gas concentration and flow rate on production of carbon nanotubes with methane and also the effect of Co-Mo and Fe-Mo on production of carbon nanotubes with a mixture of methane and carbon monoxide.