CHAPTER I
INTRODUCTION

Carbon nanotubes (CNTs) and carbon nanofibers (CNFs) have become promising substances for making composites which are stiff, flexible (Treacy *et al.*, 1996) and have high electrical (Thess *et al.*, 1996) and thermal conductivity (Collins *et al.*, 2000). Consequently, CNTs and CNFs demand has been rising with attempt to produce them in mass scale. The catalytic decomposition of carbon containing compound is believed to be a potential technique to gain a large amount of them. The formation mechanism includes first decomposition of carbon-containing gases on the metal surface at the gas-particle interface. Second, carbon dissolves in the particles, and diffuses through the bulk or on the surface of the metal particles. In the final step, carbon precipitates on the form of CNFs or CNTs at the other side of the particle (Baker *et al.*, 1989). There are many parameters relating to selectivity and yield of such carbon including reaction condition, carbon source gas, and catalyst formula. Transition metal such as iron, cobalt, and nickel are normally used as catalyst with carbon containing compound such as methane, ethane, ethylene, acetylene, carbon monoxide and benzene at reaction temperature 400-900°C. Carbon monoxide is among of the most used gases in synthesis of both carbon nanotubes and carbon nanofiber. Hence, this study aims to investigate the effect of reaction temperature, metal loading, and reaction gas on synthesis of CNTs/CNFs by using Fe/Al_2O_3 catalyst and CO/H_2 as carbon source.