

## CHAPTER I

### INTRODUCTION

In petrochemical processes, C<sub>4</sub> hydrocarbons are produced by naphtha cracking process. Several C<sub>4</sub> hydrocarbons compounds are then separated and utilized in many applications. Vinyl acetylene is one of the lowest value compounds in C<sub>4</sub> hydrocarbons. Usually, it is burnt away due to safety reason. However, it can be upgraded to higher value compounds by using selective hydrogenation process. However, using alkynes as raw materials for petrochemical processes in order to produce several chemical products is also essential. In this study, 1-hexyne is selected as a model compound for studying liquid phase selective hydrogenation of hydrocarbon. Many reports have shown that palladium supported catalysts give a high catalytic performance in the partial hydrogenation reactions of alkynes and dienes to olefins. Using bimetallic catalyst is an efficient way to improve the catalytic performances of catalysts. Furlong (1994) reported that Pd-Cu/Al<sub>2</sub>O<sub>3</sub> catalyst was more selective and active than Pd/Al<sub>2</sub>O<sub>3</sub> catalyst because the addition of Cu to supported Pd catalysts greatly improves their selectivity for hydrogenating 1,3-butadiene directly to *n*-butenes without hydrogenating or isomerizing the 1-butene and Maccarrone *et al.* (2012) also reported that bimetallic catalysts showed higher activities and very similar selectivities (>93%) than the monometallic system and further than Lindlar catalyst. The rank of activity order is: W/Pd/A > Pd/Ni/A > Pd/A >> Lindlar. Furthermore, All catalysts are active in the range of temperatures studied, 273-323 K, even at the lowest temperature. In this research, the activity and selectivity of low loaded Pd, Pd-Cu and Pd-W supported on alumina catalysts with Pd/Cu and Pd/W ratios of 0.25, 0.5, 1.0, 1.5 and 2.0 are investigated for the liquid phase hydrogenation of 1-hexyne under 1.5 bar and 40 °C.