

## CHAPTER I

### INTRODUCTION

Hydrogenation is a chemical reaction that transforms unsaturated carbon bonds to saturated one by adding hydrogen. The catalyst is vital and plays an important role for hydrogenation process. Mixed C4 is a hydrocarbon stream obtained as by-products from naphtha cracking. This mixed C4 contains a large fraction of butadiene which is separated out by extractive distillation. After butadiene separation, the mixed C4 stream still composes of vinyl acetylene, butadiene, isobutene, butenes and butanes. Typically, 1,3-butadiene, isobutene and 1-butene are economically important. Thus, the hydrogenation of vinyl acetylene in mixed C4 to 1,3-butadiene and 1-butene is attractive. In this study, 1-hexyne is used as a model compound of acetylene. The hydrogenation of 1-hexyne can be converted to 1-hexene and then *n*-hexane. For selective hydrogenation, 1-hexene is a desired product. Pd-based catalysts are universally employed in selective hydrogenation due to the high intrinsic selectivity of Pd to adsorb acetylenics. However, Pd is still relatively expensive, therefore other transitional metal e.g. Ni is suggested. The Ni nanoparticles exhibit a good performance in the catalyst activity due to their properties. Boudjahem *et al.* (2011) used the Ni 1-5%wt on porous silica to effectively hydrogenation benzene. Furthermore, Mn used as promoter to based catalyst. Han *et al.* (2007) used Mn as promoted catalyst for *p*-chloronitrobenzene to producing *p*-chloroaniline yield highly. Insorn *et al.* (2015) reported Mn-promoted Pd/Al<sub>2</sub>O<sub>3</sub> catalyst significantly increases the activity and moderately increases the yield and selectivity for 1,3-butadiene. This research aims to improve catalysts selectivity of 1-hexyne hydrogenation by using Pd and Ni, and vary amount of Ni loading. Moreover, Pd-Ni and Ni-Mn bimetallic catalysts at various Pd/Ni and Ni/Mn molar ratios were investigated for reaction. The catalysts are also characterized by BET surface area analyzer, H<sub>2</sub>-chemisorption technique, and Temperature program reduction.