



CHAPTER I

INTRODUCTION

Most chemical, especially petrochemical, industries are today involved in the use of catalyst in their processes. The rapid growth of the petrochemical industries is owed to research and development in field of catalysis as a major cause. Without the use of catalysts, important manufacturing processes may not have evolved.

In Thailand, a petrochemical complex worth thousands of million of baht was initiated 5 years ago, and is now almost operational. Personnel, especially engineers from several fields, are required. Chemical engineers, particularly the ones with a background in petrochemical, will inevitably be involved. This personnel, who are experts in various fields, are needed to make the operation of the projects complete. However, due to rapid changes in the processes caused by the improvement of catalysts, these engineers must be knowledgeable in and appreciate the importance of these substances.

Most catalysts used in the petrochemical industry usually consist of metals in the transition group. At first catalysts were composed of only one metal. This gave only fair results. After much research and development work, catalysts are now composed of several metals and give good yields during catalytic reactions. However, the preparation procedures are correspondingly complex.

The catalyst to be studied in this study comprises two

metals of the transition group, nickel and palladium. The understanding of the functions of two metals in the catalyst is expected to pave the way to continuing research about catalysts consisting of several metals. In this work, a nickel catalyst is first prepared and then incorporated with palladium. The reaction used to test the activity of this catalyst is the hydrogenation of castor oil.

1.1 The objectives of this study.

1.1.1 To find out suitable conditions for preparing Raney nickel catalysts.

1.1.2 To find out the optimum conditions for the hydrogenation of castor oil using the nickel catalyst.

1.1.3 To study the effect of Raney nickel catalyst being incorporated with palladium compound.

1.2 The Scope of This Study.

1.2.1 Selecting the suitable conditions for the preparation of Raney nickel catalysts by varying the following parameters :

- Time of Digestion : 1, 2 and 3 hours.
- Temperature of Digestion : 90°, 110°, 130° and 150°C.
- Concentration of the NaOH Solution : 12.5, 16.7 and 25 % by weight.

- Ratio of Ni-Al Alloy to NaOH : 1:3, 1:5, and 1:7.5 (wt:wt).

1.2.2 Selecting the optimum conditions for the hydrogenation reaction by varying the following:

- Concentration of Catalyst as Ni/oil : 0.1, 0.2, 0.3 and 0.4 %.
- Temperature of Reaction : 130°, 150° and 170°C.
- Hydrogen Pressure : 100, 125, 150 and 175 psig.

1.2.3 Studying the effect of palladium by incorporating it into a Raney nickel catalyst.

The percentage of Pd/Ni was varied to 0.5, 1.0, 1.5 and 2.0 % (metal/metal).