CHAPTER I

INTRODUCTION

Since Pt/KL catalysts perform high activity to linear alkane aromatization, these catalysts recently play an important role on petroleum industry. Unfortunately, their deactivation occurred sensitively by sulfur poisoning. Therefore, there have been interests in the function of these materials, which is the beginning step in solving their problem and developing these catalysts. As a consequence, the objective of this thesis is focused on exploring the function of Pt/KL catalysts. The fundamental molecules and reactions were needed to examine the Pt/KL catalyst's function.

Since n-butane, which is an elemental molecule, can hydrogenolyse to two elemental molecules, *i.e.*, methane + propane, or ethane + ethane, in the presence of hydrogen, n-butane hydrogenolysis is one appropriate reaction to investigate the Pt/KL catalyst's function.

There were several works investigated the Pt/KL catalysts and several explanations were proposed. Some of those works focused on its basicity, the microporous structure, the small Pt particles inside the channels of the zeolite, and the K^+ ions. However, after more than a decade of research, the function of these materials in alkane aromatization is still unclear. In this investigation, we are studying a series of Pt/KL catalysts by using n-butane hydrogenolysis to explore the cracking reactions inside the zeolite channels. Our catalyst's series compose of Pt/KL catalysts prepared by two different methods; Incipient Wetness Impregnation (IWI) and Vapor Phase Impregnation (VPI), and the promoted catalysts, which were promoted by a series of promoters, *i.e.*, Ce, Er, Yb. In addition to the series of Pt/KL catalysts, the Pt/SiO$_2$ catalyst was also studied as a nonmicroporous reference material.

The background and literature surveys on Pt/KL catalyst, catalyst preparation, catalyst characterization, and the hydrogenolysis of alkanes were

described in Chapter 2. The experimental details of the catalyst preparation, catalyst characterization, and reaction testing were described in Chapter 3. Chapter 4 focused on the experimental results and the discussion of those results. Chapter 5 was devoted to the conclusion of the experimental results described in Chapter 4. In appendicies, the remainning results which were not shown in Chapter 4, F value calculations, kinetic calculations, the calculations of chemicals required for IWI and VPI methods, and Langmuir-Hinshelwood kinetics were illustrated.