CHAPTER I

INTRODUCTION

The remarkable economic expansion and the rapid industrial growth in Thailand has led to great demand for lubricating base oil, used to formulate engine lubricants and industrial oils. Although Thailand has achieved success in producing many oil and gas products using its own energy resources, it still expends an enormous amount of foreign exchange for all its lube base and lubricating oil imports from several foreign countries such as Singapore, China, Japan, and Australia. In 1992 [1] the import figure reached about 14,275 tons of lube base oils (C.I.F. value 1,517 billion baht) and about 9,000 tons of lubricating oils (C.I.F. value 1,131 billion baht). To protect the country from the volatile oil market, serious efforts to develop our own indigenous resources and to utilize the nation's resources for maximum benefits should be undertaken.

Crude oils [2,3] have been discovered in several parts of Thailand particularly in the Fang resource of Chiangmai and the Sirikit resource of Kampangpetch. Up to 1,000 barrels per day of Fang basin area crude oil is fed into the Fang refinery, operated under the supervision of the Defence Energy Department (DED), Ministry of Defence. Fang crude oil, a typical paraffin-base crude, is refined by atmospheric distillation into a number of light oil fractions and a residue. This residue is further separated in the vacuum distillation tower into a light distillate (LD), a heavy distillate (HD) and a heavy fuel oil. These distillates contains high wax content and they are used as low quality and commercial value fuel oils. The waxes may separate as solids at ambient temperature thus effecting their transportability and limiting their

applications. The qualities of these distillates, especially pour point, can be improved if these waxes are removed.

Verasak [4], 1990 reported that LD and HD can be converted into the expensive lube bases for lubricating oil blending after dewaxing and solvent extraction with appropriate condition. Further research by Sasiwimol [3], 1993 has shown that HD, after dewaxing by methyl ethyl ketone, bleaching with concentrated sulfuric acid and Fuller's earth, and then subjecting to hydrotreatment on alumina supported Ni/Mo catalyst, can be used as a lubricating base oil.

Despite all these facts, the problem has never been solved absolutely and some paraffinic waxes have still remained in dewaxed oil. Moreover, some important properties of lube base oil, specifically viscosity index and pour point, have not been accuracy for requirements. As mention above, it suggested that only solvent dewaxing process, offering disadvantages in high operating cost and complicated process, is not sufficient for upgrading of HD to lube base oil. It has been known that waxy hydrocarbons, such as paraffin wax or petroleum streams containing waxy hydrocarbons, can be converted to oily materials by simple and economic technology, catalytic hydroisomerization. The Pt/F hydroisomerization catalyst is more selective for the quality improvement of hydrotreated HD oil, however, this topic has never been investigated vigorously in Thailand. In the present study, a lube base oil will be produced from Fang HD by solvent dewaxing, followed by catalytic hydrodesulfurization and finally, by catalytic hydroisomerization processes.

The purpose of the present study was to improve properties of the heavy distillate fraction from Fang Refinery to be used as lubricating base oil and to minimize the dewaxing process by using suitable hydrodesulfurization and hydroisomerization processes