CHAPTER 1

INTRODUCTION

Chlorinated paraffins are versatile materials and are used in widely differing applications. The properties which have made the chlorinated paraffins of industrail importance are viscous character, nonflammability, nontoxicity, miscibility with plasticizers, compatibility with oils and gradual liberation of hydrogen chloride at high temperature. On these properties are based their applications in the plastic industries, the textile industries and the lubricant industries. Instead of the chlorinated paraffins themselves, their conversions into lubicating oil additives, semi-synthetic base oil and detergent are also widely used [1].

Chlorinated paraffins [2] are the collective names given to industrial products prepared by chlorination of C_{10}-C_{30} paraffins and containing 20-70 % chlorine. The specific degree of chlorination and the composition of the products depend substantially on the intended application. The principal raw materials employed in the manufacture of chlorinated paraffins are mainly straight chain petroleum fractions. If a starting material containing substantial quantities of branch chain paraffin or aromatic compound is used, the products may show unusual low light and thermal stability.

The first systematic study on chlorinated paraffins was made by P.A. Bolly [3] in 1856-1858. Because of the increase in viscosity with chlorine content, Bolly was unable to prepare chlorinated paraffins containing more than 61% chlorine. In 1910, Bohringer patented a process for chlorinating the higher paraffins in carbon tetrachloride thus overcoming the difficulty experienced by

Bolly. Knowledge of the chemical nature of the lower chlorinated paraffins was advanced by the work of Asinger in 1942 and of the effect of manufacturing conditions on the properties of chlorinated paraffins by the researchers of Girelli and Siniramed in 1949 [4].

Several patented varients of the chlorination process use different temperatures for progressive stage of chlorination. A Diamond Alkali Co. [5] process introduced the first 33 % chlorine at less than 90 °C and completed the chlorination at a slightly higher temperature. In Japanese process [6], chlorination is begun at 70 °C and progressively raised to 150 °C, over a period of 24 hours. This latter process employed calcium oleate or benzoate as a catalyst.

Nowadays, crude oils [7-9] are found in several parts of Thailand particularly in Fang Resource of Chaing Mai, Sirikit Resource of Kampangpetch, as well as in Chaiyapoom province. Crude oils from these domestic resources are paraffinic base type, composing mainly of alkanes. Products from these crude oils has been sold as a low-price fuel oil, because they contain relatively high content of waxes, resulting in high pour point. They are in the form of solid at room temperature which cause problems in transportation and limit their utilizations. Although, waxes were removed from the refinery, they still remained in oil in high quantity.There have been some efforts tried to produce lubricating base oil from our own resources and they found that it had been necessary to improve properties of base oil by other processing beside dewaxing process.

Preparation of chlorinated paraffins from crude oils is one of the possible ways to convert crude oils into more valuable products. Raw material used in this study was light distillate from Fang Oil Refinery which has been in operation under the supervision of the Defence Energy Department (DED), Ministry of defence. Light distillate is about 17 % of oil obtained from crude oils distillation.

The purposes of this study were to prepare chlorinated paraffins from light distillate, to determine the physical and chemical properties of chlorinated paraffins and to study the possibility of converting chlorinated paraffins to semi-synthetic lubricating oil.