CHAPTER I
INTRODUCTION

Petroleum waxes are by-products of lubricating oils production. Petroleum waxes are removed from lubricating oils after distillation of crude oils, as shown in Figure 1.1.

Crude lubricating oils contain waxy materials (high-melting point n-paraffins, isoparaffins and cycloparaffins) which give the oils high pour points, so that oils with the waxy materials are not suitable for use as lubricating oil component, since the wax contents boil over the whole of lubricating oil distillation range. For this reason, processes have been developed at an early stage for the reduction of the wax content of oils by crystallization in order to improve the low-temperature properties and to control the viscosity of the oils. The wax removal process is called "dewaxing". [1]

Slack waxes from lube base plant can be classified as follows : 60SW, 150SW, 500SW, 600SW and 150BS SW (SW = Slack Wax). The 60SW and 150SW waxes are paraffin waxes, consist of mixtures of alkane hydrocarbons, the great majority of the components present being normal to linear alkanes with the chain length varying from about 20 to about 50 carbon atoms in the mixture. Paraffin waxes are generally white, hard, and crystalline solids, have average melting point of between 51 to 68 °C. The 500SW and 600SW waxes are intermediate waxes, essentially a continuation of the paraffin range, extending upward to 60 or more carbon atoms in length. The proportions of branched hydrocarbons increase from about 30% to about 60% of the whole. Such mixtures, containing increased proportions of higher molecular weight hydrocarbons, have average melting point of between 68 to 74 °C. Intermediate waxes are generally white, fairly hard, non-crystalline solids. 150BS SW wax is microcrystalline wax, also consists of mixture of saturated alkane hydrocarbons, but with a very much greater preponderance of branched-chain or cyclic-chain molecules. The carbon atoms content per hydrocarbon molecule can vary from low 30 to well over 80. Consequently, microcrystalline waxes are extremely complicated mixtures, and they range from hard, high melting point brittle materials to soft, sticky low melting and flexible products.

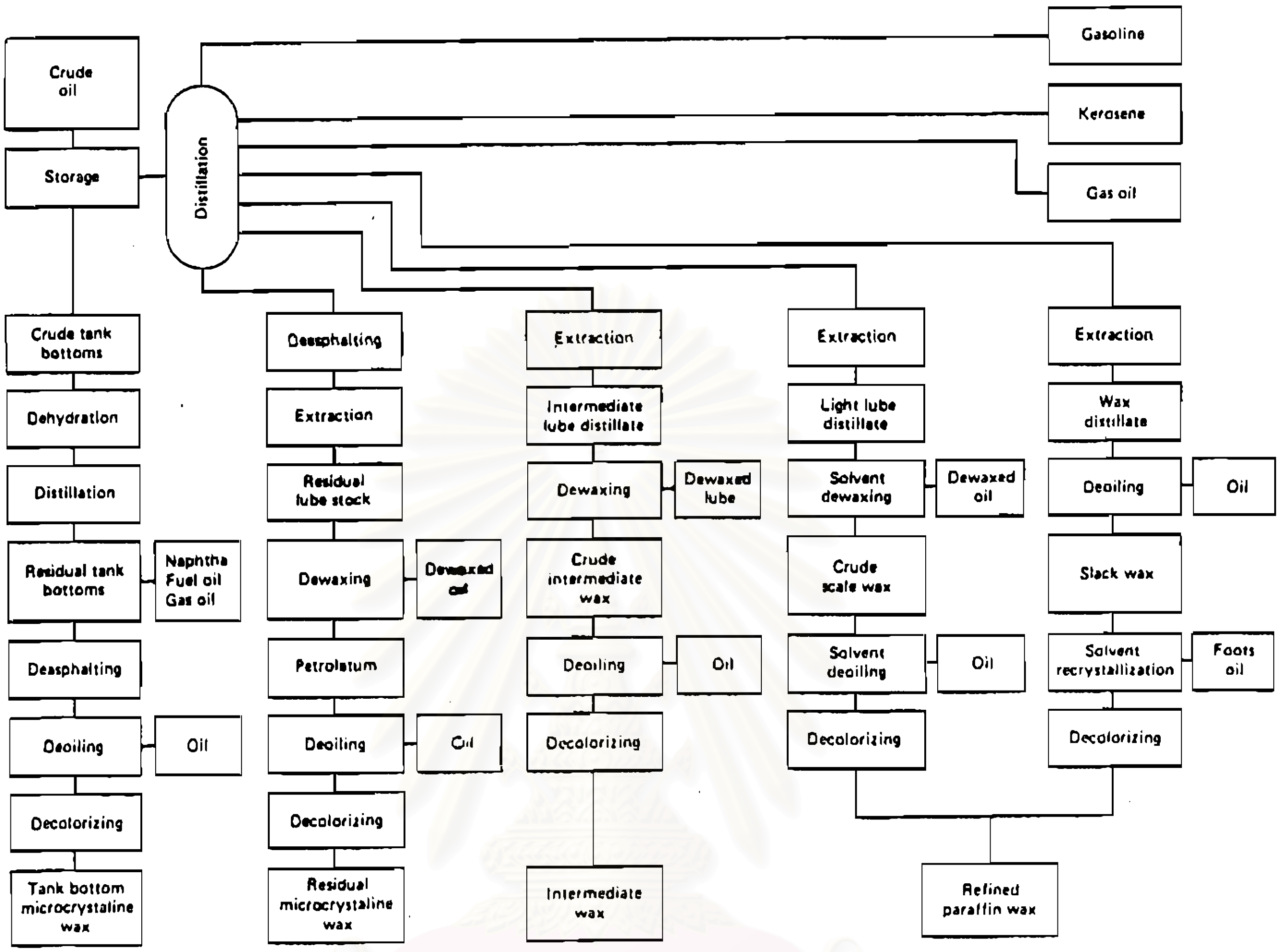

Figure 1.1 Petroleum waxes refining. [2]

The microcrystalline wax is produced either from the residual fraction of crude oil distillation or from crude oil tank bottoms. The high molecular weight fractions in crude oil precipitate from solution in large storage tanks and from a sludge that is removed periodically. These crude oil tank bottoms are essentially crude oil with very high wax contents. After deasphalting of the residual fraction, heavy lubricating oil is removed by solvent extraction. The degree of solvent extraction is dictated by the economics of the lubricating oil market.

The microcrystalline wax after purification by deoiling and clay-treating from slack wax is suitable for manufacturing of cosmetics, pharmaceuticals and etc. The microcrystalline wax produced in much smaller total volume than intermediate and paraffin waxes, respectively. In order to increase the volume of microcrystalline wax, its other source is intermediate wax. The aim of this investigation was to develop separation microcrystalline fraction (range from C_{19} to C_{52} hydrocarbons) from intermediate waxes before they are further processed to make final wax products.

Objectives and Scope of the Research

The principle objectives of this research were to separate microcystalline wax, paraffin wax and oil fractions from intermediate waxes by using solvent fractionation extraction and fractionation crystallization methods. The scope was to separate intermediate waxes type 500SW and 600SW slack waxes into fractions by means of data from theirs solubility, solvent selection, effect of temperature and solvent on slack waxes extraction and fractional crystallization. Especially, the identification of chemical structures in obtained waxes from intermediate-waxes fractionations by means of high temperature gas chromatography (HT GC) analysis was used. Additionally, some of physical properties, (i.e. specific gravity, melting point, kinematic viscosity and microscopic data) oil and sulfur contents in obtained waxes, and structural group analysis in residual oils, were studied for identification of isolated-fractions.