# CHAPTER I
# INTRODUCTION

Emulsification in brine/water of crude oil is a common problem in the oilfield industry. The formation of emulsions when produced oil and water are mixed during the production and processing of crude oils can form relatively stable dispersion of water droplets in crude oil (w/o emulsion), which are usually referred to as oilfield or petroleum emulsion. Emulsion stability can be varied from a few minutes to years, depending upon the nature of crude oil and the extent of water. Stability of water-in-oil emulsions is strongly influenced by native crude oil surfactants, i.e. asphaltenes and resins, which prevent droplet coalescence by forming a rigid film. Asphaltenes, resins, waxes and small solid particles are generally considered to be responsible for the emulsion stability. The structures of resins and asphaltenes contain hydrophobic and hydrophilic parts, which refer to their surface-active character. Other surfactants possibly present are injected chemicals (such as drilling fluids; stimulation chemicals; and injected inhibitors for corrosion, scale, waxes, and asphaltenes control) that are injected into the formation or wellbore.

The presence of water-in-crude oil emulsions, which normally increases viscosity of the crude to higher level than that of the dehydration oil, is a significant problem during well stimulation process, decreases the commercial value of the crude, interferes with refining operations, induces corrosion, increases heat capacity and reduces the handling capacity of pipelines and refining equipment. For economic and operational reasons, the prevention of petroleum emulsions or breakdown of petroleum emulsions is necessary for the oilfield industry.

Crude oil demulsification, which is referred to as a method to induce phase separation of emulsions, can be classified into three main categories. First, a mechanical method is the use of mechanical devices to facilitate coalescence of the water droplets. Second, an electrical method is the use of electric field to interfere the surface tension of droplets to provoke the rearrangement of polar molecules for enhancing coalescence of aqueous droplets in crude oil and improving phase separation. Third, a chemical method is to add the minute amount of chemical compound (usually 10 – 1000 ppm) to enhance phase separation rates. The chemical

method is considered the most economical, convenient, and effective method for dehydration of crude oils. Chemical agents typically act on the interfacial film by either reacting chemically with the polar crude oil components or by modifying the environment of the dispersed droplets (demulsification).

The purpose of this work is to study the demulsification of crude oil by using feasible chemicals with different structures. The demulsification was studied for the effect of water-to-oil ratio, demulsifier concentration, and temperature. Furthermore, economic assessment for the use of the most effective demulsifier in a large scale was preliminarily studied.