CHAPTER I
INTRODUCTION

Asphaltene precipitation and deposition can occur during the petroleum production, transportation and refinery. The asphaltene deposition causes the plugging of pipelines, the malfunction of refinery equipment as well as the catalyst deactivation. Asphaltene precipitation and subsequent carbonization were found to be the major mechanisms behind the crude oil heat exchanger fouling (Sheu and Mullins, 1995). In the enhanced oil recovery, the precipitation of asphaltene also occured during flooding with light hydrocarbons (LHC) and carbondioxide (CO_2) (Kokal, et al., 1991), and during matrix acidizing where the dissolving of ferric ions (Fe^{3+}) from pipes and instruments induced the polymerization of asphaltene molecules (Jacob, 1989).

Due to the serious problem of asphaltene deposition, which leads to the sharp decline productivity and the profitable reduction in economical point of view, it accelerates the development of remedial methods. Various methods have been proposed and used to solve this problem. Those include the chemical and mechanical treatments. The chemical treatments usually involve the use of aromatics based cleaning fluid such as toluene, xylene or mixed of aromatics to dissolve the asphaltene deposits. The mechanical removal becomes the necessary way when the asphaltene deposits are tightly condensed.

According to the environment concerns, non-hazardous chemical treatments were developed for substituting the use of toxic chemicals in solving the asphaltene deposition problems. Studies on stabilization of asphaltene using non-aromatic based fluid has been undertaken in recent years. Chang and Fogler (1993&1994) found that asphaltenes could be completely stabilized in alkane-based solutions containing a sufficient amount of ampliphiles. In a later study, Permsukarome and Fogler (1995) also found that the dissolution of asphaltene with ampliphile/alkane solutions was affected by the types and concentrations of ampliphiles, the types of solvents and the fluid temperature and flow rate.

In this study, the kinetics of the dissolutions of asphaltenes with different polarities by using the ampliphile/alkane solutions were investigated in the differential reactor. The factors such as the amphiphile concentration, the flow rate, and the temperature of the solutions were also studied how they affected the rate of dissolution.