CHAPTER I
INTRODUCTION

Most of the daily energy consumption is derived either directly or indirectly from oil and gas. The common method of oil recovery used in most of the regions of the world is rotary drilling. In rotary drilling, the production capacity decreases due to the constriction of the pores occurring at the wellbore. These problems are resulted from (1) mud invasion or fine migration (2) clay swelling caused from ion exchange (3) clay instability during hydrochloric acid treatment, and (4) mineral precipitation causing from hydrochloric acid or hydrofluoric acid treatment. Several techniques are available and currently used by the reservoir engineers to increase the flow capacity of a well. One of the most effective methods is acidization, which was investigated in the present study.

This study focused on a treatment method called the matrix acidizing. In matrix acidizing, acid is injected into the formation to remove damage and thereby increase permeability near the wellbore. The acid instantly dissolves minerals in the formation matrix to open the pore space blocked by fine particles resulted from mud invasion or fine migration. Acid is injected into the formation under appropriate pressure considerably less than the formation fracturing pressure. The acid reacts with zeolite found in the formation. With proper conditions, matrix acidizing usually increases oil production without increasing the percentage of either water or gas produced.

Most petroleum reservoirs are found in sandstone formation. In a number of offshore oil wells, the discovery of the common occurrence of the zeolite mineral analcime as sandstone cement has contributed to an overhaul of standard completion and stimulation procedures in the field. Analcime is a low-density and hydrated mineral with a strong tendency to form hydrated gels in concentrated hydrochloric acid. This property create a serious potential for premature spending of acids and formation of silicate gels or scale which can potentially damage the near wellbore region.

The main focus of this research was to study the kinetics of dissolution of analcime, a zeolite found in the oil bearing formation of the Gulf of Mexico, in hydrochloric acid at different acid concentrations and temperatures.