CHAPTER I
INTRODUCTION

Oil well stimulation processes have long been used to improve recovery from existing wells. Matrix acidization is one such treatment that is used to increase the productivity of formations of relatively high permeability. Compared to the other stimulation techniques, this is a low budget and low volume process, yet can bring about a multifold increase in the productivity. However, it has been reported that productivity of some of the oil wells in the Gulf of Mexico plummeted dramatically after acid treatments (Underdown, 1990). It was found that this was a result of pore blockage by a silica precipitate. The formations in the area were found to be largely cemented with a zeolite analcime, the dissolution of which was causing the gel formation. Hartman (2006) has shown that analcime and different type-Y zeolites form precipitates on dissolving in hydrochloric acid.

In order to avoid or minimize loss in productivity, it is imperative for the oil industries to understand the dissolution and the subsequent silicate precipitation from a mechanistic viewpoint while treating analcime cemented formations. A good acidization design would help to tap the full potential of acidization treatments, which have hitherto been relying only on empirical correlations and field experiences. Variables such as pH and temperature have been found to affect zeolite dissolution and the precipitation rates, and also the time of appearance of the precipitate, i.e., the lag time (Hartman, 2006; Hartman and Fogler, 2005, 2006). Understanding the effects of other variables which could be encountered in the well conditions, such as that of different salts, ionic strength and additives like corrosion inhibitors would help in developing better designs.

The goal of this study is to develop an understanding of the effects of different anions on analcime dissolution and the silicate precipitation. Ultimately, a comprehensive model for analcime dissolution and silica precipitation would be developed for field use. Information gained from the studies related to analcime could be used for other zeolites which could be found in oil bearing formations.