CHAPTER 1
INTRODUCTION

1-1 General Introduction

Two and three-phase relative permeability are the most important properties of porous media. In order to perform reservoir forecasting in a multi-phase situation, these functions have to be specified as accurately as possible. The term permeability historically has been adopted as a measure of the porous rocks' ability to conduct fluid. If only one fluid is present in the interstices, this transport coefficient is called the specific permeability, but otherwise one must make reference to the effective permeability of each of the immiscible fluids in the connected pore space . Relative permeability is important for evaluation ,history matching ,effective management and characterization of multiphase flow in a petroleum reservoir.

Relative Permeability is the ratio of the effective permeability for a particular fluid to reference or base permeability of the rock such as the absolute permeability to water, effective permeability to oil at irreducible water saturation (S_{wi}) or air permeability:

$$K_r=K_{eff}/K_{abs} \qquad (1\text{-}1)$$

The permeability has the sense of a transport coefficient that appears in Darcy's equation for single-phase flow, effective and corresponding relative permeability functions also can be thought of analogously as important transport coefficients by which multiphase flow processes are best described. In many cases, the relative permeabilities applied are those obtained by normalizing the effective permeability curves with the absolute permeability.

The function of relative permeability is influenced by many factors such rock structure ,fluid properties, wettability , saturation history and capillary .

The relative permeability can determine the irreducible fluid saturation , residual fluid saturation and fluid distributions.

Experimentally there are two basic methods for obtaining relative permeability data, the more commonly used unsteady state method and the steady state method from

this major method it's divided more laboratory methods such Hasslar , JBN ,Centrifuge , Penn-State and Welge (Heaviside, J. et al ,1983) .

1-2 Statement of the Problem

Conventionally, the determination of relative permeability requires laboratory experiments, which are expensive and time consuming .Assuming that core material has been available, typically a limited number of core plugs are considering for testing, often resulting in an incomplete reservoir description . There is uncertainty in the results from two different methods of relative permeability in the same formation .

1-3 Study Objectives

The primary objectives of this study were:

1- Measure and normalize the relative permeability for an oil/brine in a sandstone core using the Unsteady state and Centrifuge methods.
2- Investigate and comparison of the relative permeability curves for the two methods.

1-4 Thesis Outlines

This study was divided into several chapters: Chapter two contain theoretical background and literature review and chapter three discussed the method of centrifuge and unsteady state relative permeability. The results and discussions are displayed in Chapter four. Chapter five contains the study conclusions and recommendations.