INTRODUCTION
CHAPTER I
Introduction

Studies on the Thermodynamic properties of binary mixtures help us in the interpretation of the nature of molecular forces operating between the molecules of different components before and after the mixing. The use of liquid mixtures for the purpose of studying strong specific interactions between different molecules is of much longer standing. One of the aims of these studies is to know about the nature of molecular interactions occurring in the mixture and if possible to get clue about the extent of such interactions. There has been a considerable progress, in the past, regarding the development of molecular theories of fluid and fluid mixtures. The availability of computer simulated results on the model systems provide us with invaluable quasichemical data for testing these theories. However, in spite of the tremendous progress, the predicting power of these theories is limited mostly to fluid and fluid mixtures consisting of small non-polar molecules. The problem lies in the non-availability of exact intermolecular potential and the commonly made assumption of pairwise additivity in most of the calculations is seldom justified. Although the field of intermolecular forces is of much current research activity, yet it seems a distant goal that intermolecular forces between the molecules of commonly used organic liquids in the laboratory as well as in the industries will become available in the near future. The properties of liquid mixtures are of considerable interest to the chemi-
cal engineers and chemists for design purposes. Therefore, recourse has generally been taken to the experimental measurement of properties of liquid mixtures. The experimental data also helps us in testing the existing theories of liquid mixtures and provide clues for the modifications in these theories.

Excellent work has been done in the field of solution thermodynamics by Raoult\textsuperscript{1}, Van laar\textsuperscript{2}, Lewis\textsuperscript{3}, Hildebrand\textsuperscript{4,5} and Scatchard\textsuperscript{6} in the past fifty years. Flory\textsuperscript{7,8} and Huggins\textsuperscript{9,10} solved the problem of predicting excess thermodynamic functions theoretically. Later on Flory and his coworkers made Prigogine's theory\textsuperscript{11} adaptable to experimental results and formulated a new equation of state theory\textsuperscript{12-14}. The new Flory theory laid emphasis on the importance that equation of state contributions can have on solution properties. A new lattice theory\textsuperscript{15} with holes has also been shown to resemble Flory's equation of state theory.

Deviation from ideality of real mixtures can be best expressed using excess thermodynamic functions. Information regarding these can be obtained by measuring physical properties like (i) equilibrium vapour pressure of solutions (ii) enthalpy change on mixing of components and (iii) volume change on mixing of components etc. Recently other thermodynamic quantities such as compressibilities, expansivities, specific heats and ultrasonic velocities have been studied to provide useful information regarding the nature and properties of liquid mixtures.
In the present work, the excess volumes, ultrasonic velocities and excess enthalpies of some ether-solvent systems are reported at 303.15 K. Some characteristic features of the thermodynamics of solutions and theories of binary solutions have been briefed in chapter II.