

CHAPTER I

INTRODUCTION



1.1 Significance of Problem

Process fluids in chemical industries are generally multicomponent mixtures, and the knowledge of their thermodynamic properties is important for rational chemical process design applications and for modeling of process operation. The density data of multicomponent mixtures are required in many chemical engineering calculations with a suitable equation of state to predict other thermodynamic properties of mixtures. Relatively few investigations deal with ternary systems on n-alkane, aromatic and cyclic hydrocarbons. The ternary system of n-heptane, benzene and cyclohexane is required for an engineering application because it is a representative multicomponent system, containing cycloparaffin, a straight chain aliphatic and aromatic hydrocarbons.

Some sets of liquid densities data have already been reported for the binary system of benzene and cyclohexane at 293.15 K (Anwel et al., 1992) and 298.15 K (Dimitri et al., 1991; Chevalier et al., 1990), the binary system of benzene and n-heptane at 293.15 K (Anwel et al., 1992), 297.85 K (Thomas et al., 1989) and 298.15 K (Stefanos et al., 1989), and the binary system of cyclohexane and n-heptane at 298.15 K (Dimitri et al., 1991) and 298.15, 303.15 and 308.15 K (Aminabhavi et al., 1996). All these data are measured at atmosphere and over the whole range of mixture compositions.

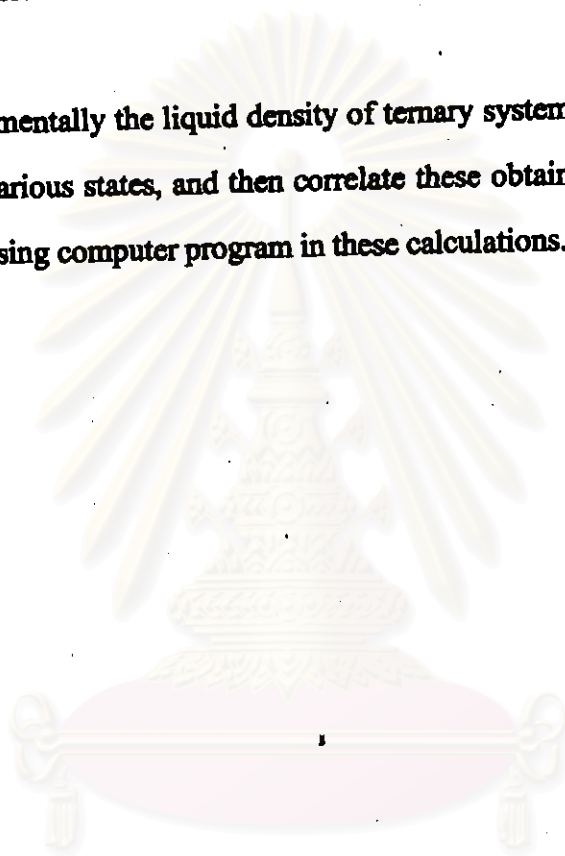
In this work densities data were measured for ternary system of n-heptane, benzene and cyclohexane as well as their binaries system of liquid phase at temperature of 308.15, 313.15, 323.15 K and 333.15 K and pressure of 1.01325, 2, 5 and 10 bar. Each of the binary system data can be used to determine binary interaction parameters of four well-known equations of state which are Modified Redlich-Kwong, Peng-Robinson, Peng-Robinson-Stryjek-Vera and Peng-Robinson-Stryjek-Vera2.

1.2 Objective

Densities of ternary system of n-heptane, benzene and cyclohexane at various states were determined and a suitable equation of state for this system was determined.

1.3 Scope of Research

Measure experimentally the liquid density of ternary system of n-heptane, benzene and cyclohexane at various states, and then correlate these obtained data with a suitable equation of state by using computer program in these calculations.



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