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PREDICTION OF PHYSICAL & THERMODYNAMICAL PROPERTIES FOR BINARY SYSTEMS USING EQUATION OF STATE

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ABSTRACT:- A single equation of state (EOS) such as Soave – Redlich Kwong EOS can accurately describe both the liquid and vapour phase, therefore it is used for binary systems to predict some physical and thermodynamical properties. Two methods, which are Soave- Redlich Kwong and Generalized Compressibility Factor Correlation are compared and adopted for the cubic equation of state to calculate molar volume, density, viscosity, thermal conductivity, specific heat and compressibility factor.

In this paper a computer program is developed requiring critical properties to perform these calculations. The results are compared with some available literature data, and we find that the computer programs are shown to be adequately reliable for this purpose, with deviation in some properties equal to (3.6%) as other predictive programs and procedures. Also from this comparison we notice that the Generalized Compressibility Factor Correlation method is better and more general than the Soave- Redlich Kwong.

Keywords: equation of state; prediction of physical & thermodynamic properties; binary mixtures.

INTRODUCTION

The process of obtaining accurate value for the physical and thermodynamical properties for hydrocarbon is most important in all the different chemical industries, especially for non-ideal multicomponent systems and those for which no experimental values are available.

There are two traditional classes of thermodynamic models for phase equilibrium calculations: one is liquid activity coefficient and the other is equation-of-state models. Activity coefficient models can be used to describe mixtures of any complexity, but only as a liquid well below its critical temperature. Any mathematical relation between volume, pressure, temperature, and composition is called the equation of state. Many equations of state have been proposed, but most all of them are essentially empirical in nature.

The viral equation is appropriate only for the description of properties of gases at low to moderate densities. The viral equations of state are polynomials in density. The simplest useful polynomial equation of state is cubic, for such an expression is capable of yielding the