Abstract—The study conducted in this research are Viscosities, \( \eta \), and Densities \( \rho \), of 1, 4-dioxane with Bromo benzene at different mole fractions and various temperatures in the atmospheric pressure condition. From experimentations excess volumes, \( V_E \), and deviations in viscosities, \( \% \eta \), of mixtures at infinite dilutions have been obtained. The measured systems exhibited positive values of \( V_m E \) and negative values of \( \% \eta \). The binary mixture 1, 4-dioxane + Bromobenzene show positive \( V_E \) and negative \( \% \eta \) with increasing temperatures. The outcomes clearly indicate that weak interactions present in mixture. It is mainly because of number and position of methyl groups exist in these aromatic hydrocarbons. These measured data tailored to the nonlinear models to derive the binary coefficients. Standard deviations have been considered between the fitted outcomes and the calculated data is helpful deliberate mixing behavior of the binary mixtures. It can conclude that in our cases, the data found with the values correlated by the corresponding models very well. The molecular interactions existing between the components and comparison of liquid mixtures were also discussed.

Keywords—1,4-dioxane, Bromobenzene, Density, Excess molar volume, Viscosity, Viscosity deviation, Oswald viscometer and Oswald Sprengel Pyknometer

I. INTRODUCTION

THIS Measurements and predictions in chemical design and effective chemical process optimization, the molecular interactions existing in process fluids and thermo physical properties like Densities and viscosities playing key role. These two are essential for engineering designs involving chemical separations, heat transfer, mass transfer, and fluid flow and important from practical and theoretical points of view for understanding liquid theory. 1, 4-dioxane is cyclic ether that has electron donor ability toward the aromatic rings that act like weak electron acceptors. Therefore, the 1, 4-dioxane+aromatic hydrocarbon mixtures will be interesting because they involve charge transfer interactions that may be influenced by the presence of alkyl groups on the ring. Other uses of 1,4-dioxane include the manufacture of adhesives, cements, deodorant fumigants, cosmetics, drugs, cleaning preparations, magnetic tape, plastic, rubber, insecticides, and herbicides, and as a chemical intermediate.

II. EXPERIMENTAL SECTION

A. Materials:

1,4-dioxane, Bromobenzene this were all supplied by M/s E.Merck Ltd. With stated purities of better than 99% were stored over molecular sieves (0.3 nm). 1, 4 Dioxane with a purity of 99% was provided by Sigma-Aldrich Chemicals and was used without further purification. To minimize the contact of these reagents with moist air, the products were kept in sealed bottles in a desiccator. The purity of the substances was determined by GLC. Densities and viscosities of pure substances and their comparison with literature values are listed in Table 1.