non-associated liquids such as chlorobenzene, methylbenzoate and ethylbenzoate, the value of ΔF^{E}_{ab} is almost nil supporting the fact that there is no tendency for clustering of dissimilar molecules in such mixtures.

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MUTUAL DIFFUSION COEFFICIENTS OF BINARY LIQUID MIXTURES

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RECENTLY, considerable effort has been bestowed on the study of mutual diffusion coefficients D from both experimental and theoretical points of view[1–3]. Of the several experimental techniques[4–9] to study the diffusion coefficients, analytical ultracentrifuge has rarely been used[1, 10]. In this study we present data for mutual diffusion coefficients in five sets of liquid mixtures comprising cyclohexane, carbon tetrachloride, benzene, bromobenzene, chlorobenzene, ethanol and methanol.

The reagent grade solvents used were purified by fractionation through a five feet column. The purity of these solvents was tested by gas chromatography, density and refractive index. The impurity did not exceed 0.005 mol%. The density and the refractive index values varied in the fifth decimal place as compared to literature values. The mixtures were made up in special stoppered weighing bottles to prevent preferential evaporation losses. For each pair, the solvent mixtures were prepared by varying 2 volume percent in composition and the average of these two compositions is reported.

The dependence of mutual diffusion coefficients on composition of the mixture is exhibited in figures 1 and 2. Judging from the scatter of experimental points, the maximum deviation in D for any of the runs is about 3%, while the average deviation from the curve is somewhat less than 1 to 2%. In figure 1 are plotted the diffusion data for mixtures of cyclohexane-carbon tetrachloride, carbon tetrachloride-benzene and bromobenzene-chlorobenzene for the reason that these mixtures are nearly ideal. The present data are in good agreement with literature findings[7, 11–13].

In figure 2 are plotted the diffusion data for mixtures of carbon tetrachloride-methanol and carbon tetrachloride-ethanol. The differences from literature values are due to the involvement of an anisotropic solvent, namely, methanol or ethanol as one of the components of the mixture. Of these, the carbon

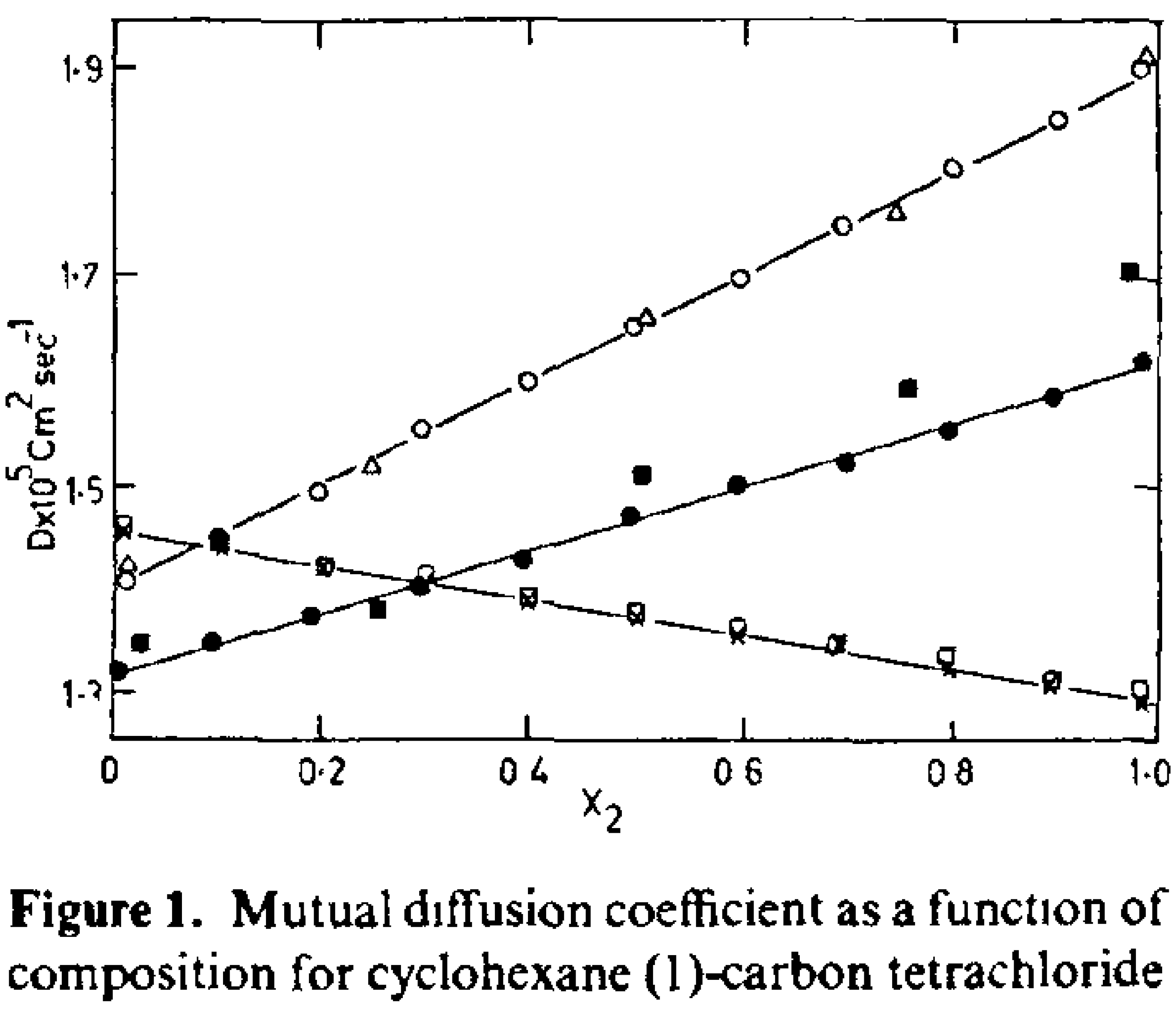


Figure 1. Mutual diffusion coefficient as a function of composition for cyclohexane (1)-carbon tetrachloride (2), carbon tetrachloride (1)-benzene (2) and bromobenzene (1)-chlorobenzene (2) systems. Symbols: X present data (25°C), □ data from ref. 16 (25°C) for C_6H_{12}–CCl_4; ○ present data (25°C) △ data from ref. 13 (25.26°C) for CCl_4–C_6H_6 and ● present data (25°C), ■ data from ref. 13 (26.78°C) for C_6H_5Br–C_6H_5Cl.

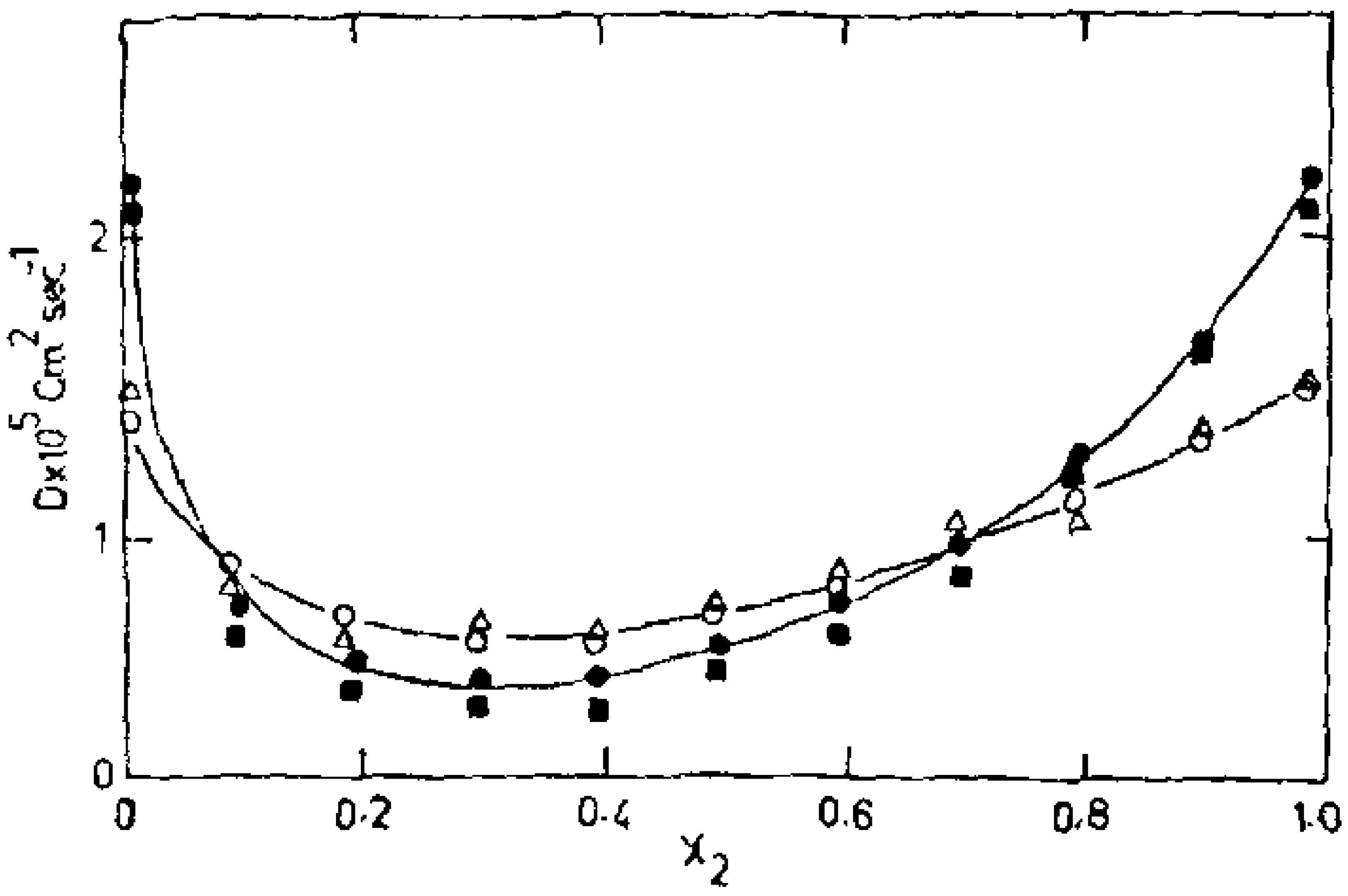
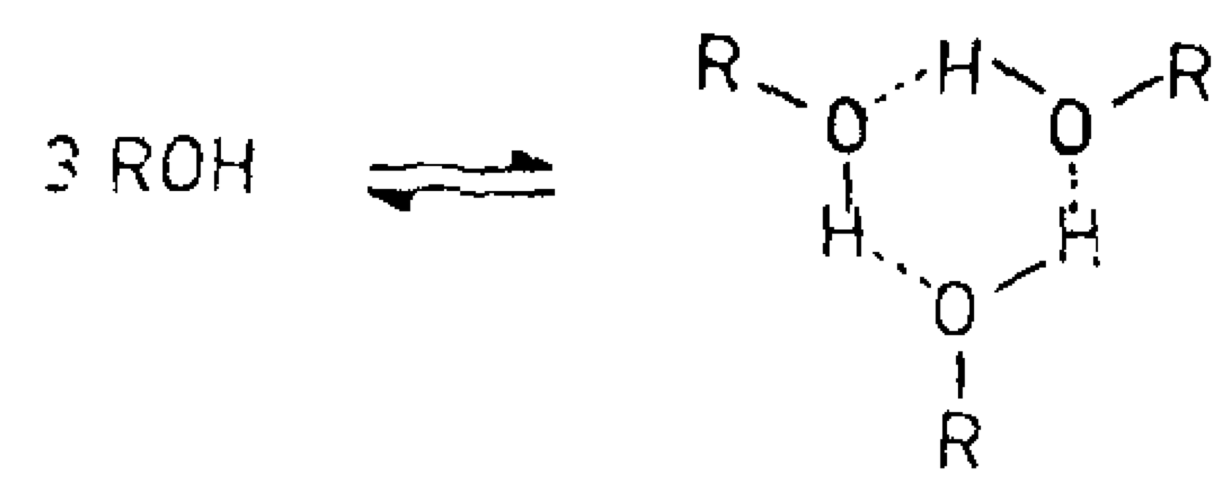


Figure 2. Same as in figure 1 for carbon tetrachloride (1)-methanol (2) and carbon tetrachloride (1)-Ethanol (2) systems. Symbols: ● present data (25°C), ■ data from ref. 16 (25°C) for CCl_4–CH_3OH; ○ present data (25°C), △data from ref. 15 (25°C) for CCl_4–C_2H_5OH.

tetrachloride-ethanol system agrees well with literature data[14] whereas for the carbon tetrachloride-methanol system our values are systematically higher than those of Sanchez *et al*[15, 16].

The disagreement from literature values may be attributed to several reasons of which the anisotropic shape of ethanol and methanol molecules and formation of hydrogen bonded associated complexes are important. In this context, the following quasichemical equilibrium seems to be predominant



(monomers) (complex)

where $R = -CH_3$ or $-CH_2CH_3$

At high concentrations of carbon tetrachloride in the mixture a steep decrease in D may be due to the breaking of the solvent structure till it attains a minimum around $x_2 = 0.3$ (figure 2). In the neighbourhood of this region the equilibrium (*i.e.* equation (1)) is pushed towards the associated complex side. However, with the gradual increase in the alcohol content of the mixture, the normal structure of the alcohols is attained thereby increasing the value of D.

The present method is fast and accurate and requires a minimum amount of the sample as compared to several other methods.

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A NOVEL SPRAY REAGENT FOR CHROMATOGRAPHIC DETECTION OF TRICHOTHECENE TOXINS

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THE trichothecene mycotoxins are a chemical group of macrocyclic fungal metabolites having the tetracyclic