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NOTE

Binary System of Cyclohexane with Chloroalkanes, Benzene, Toluene and Xylene

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Dye indicator spectral absorbance of binary mixtures of cyclohexane with chloroalkanes, benzene, toluene and xylene indicate molecular interactions (high or low) among these liquids on the graphs showing them.

Rastogi and Yadava[1] studied the excess volume for cyclohexane + carbon tetrachloride. Modi and Desai have studied interactions between chloroalkanes with hexane or heptane[2]. Modi also studied the interactions between diethyl ether. with chloroalkanes, benzene, toluene and xylene[3].

Cyclohexane and chloroalkanes, benzene, toluene and xylene of M/10 concentration solution and dye dimethyl yellow (D.M.Y.) of 5.0×10^{-5} M concentration solution were prepared in petroleum ether (60–80°C); different sets of solutions were prepared by increasing cyclohexane and chloroalkanes, benzene, toluene, xylene dye dimethyl yellow concentration being constant and made up to 25 mL with petroleum ether.

A Shimadzu double beam spectrophotometer UV-160 A was used for spectral measurements. Absorbance of pure dye solution at λ_{max} in each set of solutions was measured and plotted against increasing cyclohexane concentration. The graph indicates peak corresponding to the ratio of concentration of two liquids in stoichiometric proportions is indicated in graph-I.

The interactions of cyclohexane with chloroalkanes, benzene, toluene and xylene show 1:2 peaks. The hydrogen of cyclohexane interacts with —Cl of chloroalkanes (*i.e.*, $CHCl_3$, CCl_4, CH_2CH_2). In case of CCl_4 it acts as polar solvent in petroleum ether, while in the case of benzenes H of cyclohexane interacts with π-electrons of benzene. In case of toluene the same interactions are observed due to $—CH_3$ group with increased charge. In presence of two $—CH_3$ groups in xylene, creating steric hindrance, H of cyclohexane does not interact with xylene, hence no peak is observed.

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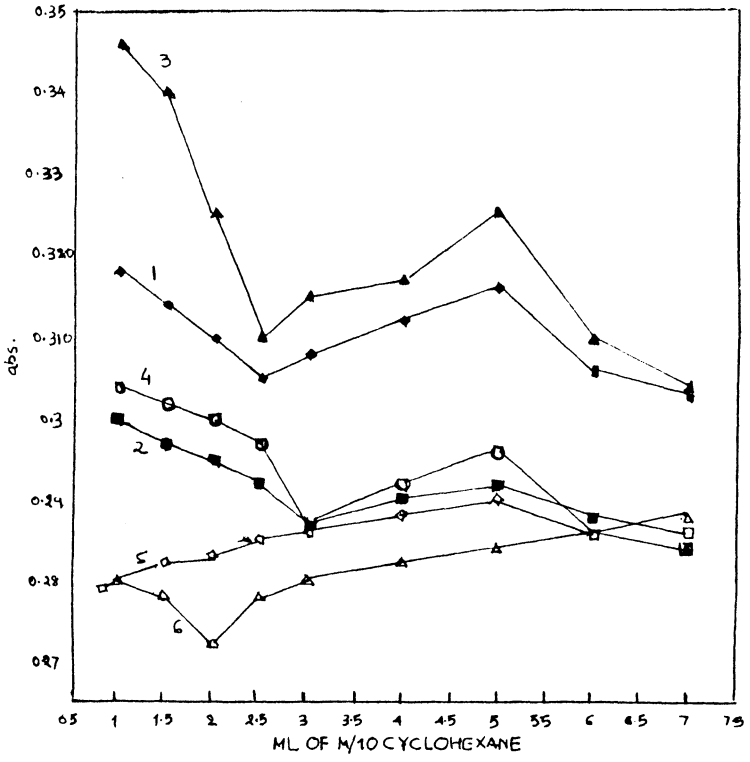

Graph-I

1. mL of cyclohexane + 2.5 mL $CHCl_3$ + 5mL 5.0×10^{-5} M D.M.Y ▮
2. mL of cyclohexane + 2.5 mL CCl_4 + 5mL 5.0×10^{-5} M D.M.Y ■
3. mL of cyclohexane + 2.5 mL CH_2Cl_2 + 5mL 5.0×10^{-5} M D.M.Y ▲
4. mL of cyclohexane + 2.5 mL Benzene + 5mL 5.0×10^{-5} M D.M.Y ○
5. mL of cyclohexane + 2.5 mL Toluene + 5mL 5.0×10^{-5} M D.M.Y □
6. mL of cyclohexane + 2.5 mL Xylene + 5mL 5.0×10^{-5} M D.M.Y Δ

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