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Buffering [Flattency] Behaviour of Hydrophilic Interactions in H_2O-$(C_2H_5)_3N$ Binary Solution System

MAN SINGH* and SUNITA
Department of Chemistry, Desh Bandhu College
University of Delhi, New Delhi-110 019, India

The weakly hydrogen bonded hydrophobic and hydrophilic interactions in large proportions of aqueous triethylamine solutions were visualised to be of vertical solubility flattency with greater temperature sensitivity and horizontal temperature flattency with higher solubility; the quantitative evaluation of hydrophobic and hydrophilic interactions was observed to record an inhibition of hydrophobic interactions. The remarkable shift in the behaviour of mutual wetting temperatures and critical wetting coefficients of these systems was observed to be the basis of overall molecular orientations, dispersing and stabilization of solution networking.

INTRODUCTION

The studies of water-triethylamine (Et_3N) solutions were undertaken for the understanding of coagulating, occulating and stability effects of Et_3N on water structure. A simple and short technique of their mutual solution temperatures and critical wetting stability with Et_3N proportion in aqueous solution was chosen for the experimental work and the study of the effect of $[CH_3—]_3$ on water is of tremendous current interest.

EXPERIMENTAL

The required triethylamine (Et_3N) was of high degree of purity and of AnalaR grade and demineralised double distilled water was used for sample solution preparation. Proportionate amounts of Et_3N and water were taken into sample container for their phase viewing and concordant phase temperature measurements and the sample container was kept in glass-walled water bath of 20 litre capacity. The phase temperature measurements were made for the disappearance or reappearance of the phase solution. The accurate water addition for the preparation of solutions of different proportions was made in the sample container by a thin plastic needle-syringe; for every water addition the needle-syringe system with water was weighed before and after every addition operation and the phase temperature was noted down for all the prepared sample solutions.

RESULTS AND DISSCUSSION

The mutual wetting temperature values and phase formation of aqueous Et_3N

solutions of different compositions were recorded as function of triethyl amine percentage in solution. The plot between mutual wetting temperature with respect to phase dynamics and percentage composition of Et_3N in sample is drawn in Fig. 1.

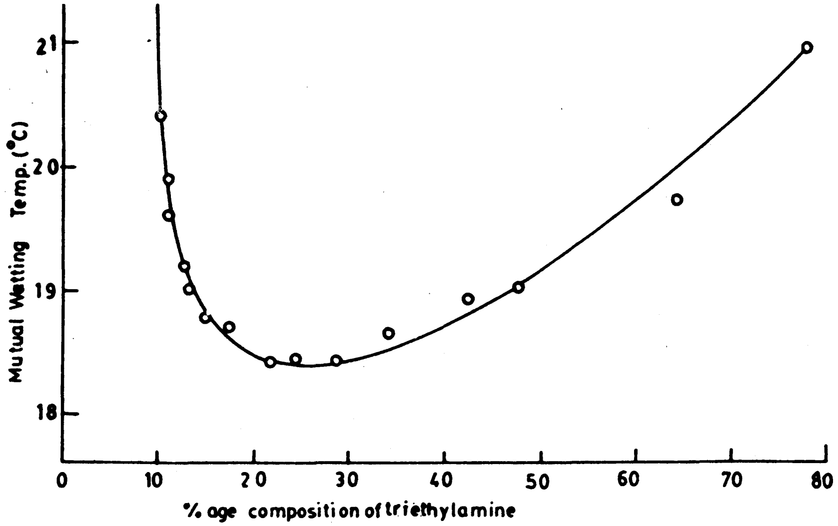
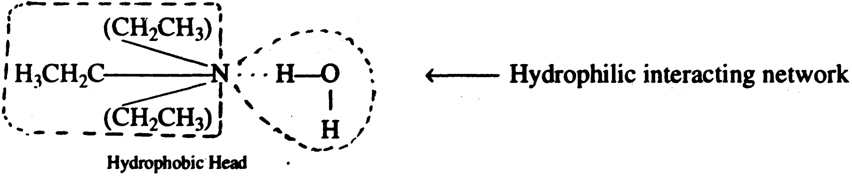


Fig. 1. Water Et_3N system

The flattening data points of phase temperature and Et_3N solubility were observed in the form of a drastic shift associated with the behaviour of Et_3N interactions in its aqueous solution systems. The solubility of Et_3N in its aqueous solutions was seen to be considerably weak, even if it was present in a very low percentage (10%) (Fig. 1) in its aqueous solution probably in the 20.5–100°C temperature range. It was seen to be the infinite (α) relationship between its solubility (turbidity) or wetting (phase dissolution) and temperature values. The lowering of temperature was observed to be a favourbale effect (Fig. 1) for the higher solubility of triethylamine in its aqueous solution.

The higher percentage of Et_3N in its aqueous solutions was found to be a suitable factor for complete intermixing^2 or absolute hydrogen bonded network formation which seems to bring about a stabilizing effect on its interactions (Fig. 1). The hydrophobic interactions at lower temperature were found to be weaker and phase formation due to three ethyl groups was also seen to disappear.

The soluble interacting network in its aqueous solutions was visualised to be most suitable at lower temperature (Fig. 2).



The hydrophilic[3] interactions between →N and water molecules and weak hydrophobic interactions between ethyl (C_2H_5—) and water (Fig. 2) molecules were seen to be specific in nature. The molecular twisting and orientiational model of the system's moieties was observed to be more effective at lower temperature. A 10–15% composition of triethyl amine in its aqueous solution was marked to be tending towards high hydrogen bonding or interactions between Et_3N and water molecules at 20.5 to 18.5°C. A further increments in the percentage solubility of Et_3N in aqueous solutions at 20.5°C to 18.5°C was marked to be bringing about a solubility (Fig. 1) in the hydrophilic interactions between triethylamine and water molecules and decrease hydrophobic interactions between the ethyl (—CH_2CH_3) group and water molecule. The constancy observed in Fig. 1 was seen to be attributed to the supersaturated hydrogen bonding or supersaturation in the hydrophilic as well as hydrophobic interactions in the binary solution system.

The observed flattency in the graph (Fig. 1) in the range of 25 to 55% of Et_3N and its aqueous solution at 18.5°C was marked to show characteristic stability[4] which was seen to bring about a buffering effect with respect to the hydrophilic and hydrophobic interactions. The most suitable complex phase[5] phenomenon in solution was marked to bring about an equalizing effect with respect to hydrophilic and hydrophobic interactions.

Biotechnologically and physico-chemically this flattency proved to be an asset for most of the technologists and interdisciplinarians for understanding complicated molecular orientations in solutions. This may also be seen to be used as a standard tool to standardise the thermometers and other operations suitable at the fairly constant low temperature range.

But after the limit of the equating line (flattency) or tie line the 55–60% (Fig. 1) composition in aqueous solution was seen to be the flattening breaking effect. This higher percentage was observed to bring about a flattency breaking effect again when the higher marked composition of Et_3N was to be disrupted and was also seen to bring about a new molecular orientation[6]. The temperature was seen to play the key role in wetting of Et_3N-H_2O, the solubility of Et_3N in its aqueous solutions.

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