

Accepted Manuscript

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PII: S0167-7322(16)31965-1
DOI: doi: [10.1016/j.molliq.2017.02.064](https://doi.org/10.1016/j.molliq.2017.02.064)
Reference: MOLLIQ 6977

To appear in: *Journal of Molecular Liquids*

Received date: 19 July 2016
Revised date: 15 February 2017
Accepted date: 16 February 2017

Please cite this article as: N.K. Karthick, P.P. Kannan, A. Mahendraprabu, G. Arivazhagan, N. Suganya , Spectroscopic studies on the binary solutions of ethanol with 1,4-dioxane. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi: [10.1016/j.molliq.2017.02.064](https://doi.org/10.1016/j.molliq.2017.02.064)

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Spectroscopic studies on the binary solutions of ethanol with 1,4- dioxane

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FTIR spectral measurements have been carried out on the binary solutions of ethanol with 1,4 - dioxane at the compositions 0.2:0.8, 0.4:0.6, 0.6:0.4, 0.8:0.2 (mole fraction of ethanol : mole fraction of 1,4- dioxane) at room temperature. There seems to be no change in the geometry of the open polymeric forms of ethanol in the presence of 1,4-dioxane. $(\text{ethanol})O - H \cdots O (1,4 - \text{dioxane})$, $(\text{ethanol methyl})C - H \cdots O (1,4 - \text{dioxane})$ and $(1,4 - \text{dioxane})C - H \cdots O (\text{ethanol})$, and heterointeractions coexist in the binary solutions. In 1,4- dioxane rich solutions, the dissociation of ethanol molecules is the dominant effect than the $(\text{ethanol})O - H \cdots O (1,4 - \text{dioxane})$ heterointeraction. All the heterointeractions are weakened in ethanol rich solutions where the ethanol molecules tend to attain their higher order multimerization through their self association. NMR and UV-vis spectroscopic studies have been carried out on the system ethanol + 1,4-dioxane. The change in the chemical shift positions of methylene and methyl carbon nuclei in the solution and the hyperchromism, bathochromism and hypsochromism observed in the UV-vis spectrum compliment the heterointeractions suggested by FTIR studies.

Keywords: self association, redshifting hydrogen bond, heterointeraction, hyperchromism, bathochromism, FTIR spectra.

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