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## Volumetric Behaviour and Isentropic Compressibility of Formamide with dialkylaminoethanols

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### **Highlights:**

1. Hydrogen bonding occurs between FA+2-DMAE /2-DEAE molecules
2. Molecular association follows: FA + 2-DEAE > FA + 2-DMAE
3. The magnitude of  $\kappa_s^E$  or  $K_{s,m}^E$  value follows the trend: FA+ 2-DEAE > FA + 2-DMAE.

### **Abstract:**

The volumetric properties and isentropic compressibilities of binary mixtures of formamide (FA) with 2-dialkylaminoethanols viz. 2-dimethylaminoethanol (2-DMAE) and 2-diethylaminoethanol (2-DEAE) were evaluated over the entire composition range at 303.15, 313.15 and 323.15 K and at atmospheric pressure. The excess partial molar volumes ( $\bar{V}_{m,1}^E$  and  $\bar{V}_{m,2}^E$ ), excess isentropic compressibility ( $\kappa_s^E$ ), excess partial molar compressions ( $\bar{K}_{s,m,1}^E$  and  $\bar{K}_{s,m,2}^E$ ) are deduced. The partial molar volumes ( $\bar{V}_{m,1}^\circ$  and  $\bar{V}_{m,2}^\circ$ ), partial molar compressions ( $\bar{K}_{s,m,1}^\circ$  and  $\bar{K}_{s,m,2}^\circ$ ), excess partial molar volumes ( $\bar{V}_{m,1}^{\circ E}$  and  $\bar{V}_{m,2}^{\circ E}$ ), and excess partial molar compressions ( $\bar{K}_{s,m,1}^{\circ E}$  and  $\bar{K}_{s,m,2}^{\circ E}$ ), at infinite dilution, over the entire composition range are also calculated. The knowledge of the volumetric properties and molar compression aids to understand specific molecular interactions existing between the FA and 2-DMAE/ 2-DEAE molecules of the binary system. The strength of intermolecular interactions in these mixtures follows the order: FA+ 2-DEAE > FA + 2-DMAE. The required experimental data are used from our earlier work on the volumetric and acoustic study published in J. Mol. Liqs. 219 186 (2016).

**Keywords:** partial molar volume; isentropic compression; excess properties; molecular interaction

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