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**Concentration and Temperature Dependence of Viscosity in Mode-Coupling Theory of Binary Mixture of Water and Phenol**

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**Abstract**

The dynamic shear viscosity of a binary liquid mixture of water and phenol has been measured at different temperatures ($32.0 ℃\leq T\leq 75.0 ℃$) and different concentrations (0.00% up to 100.00% by weight of phenol) by using glass capillary viscometer and Brookfield viscometer model DV-I+. The critical temperature and critical concentration have been determined to be 67.0 $℃$ and 33.90% by weight of phenol respectively. The mode coupling theory (MCT) has been used to calculate the value of background viscosity (noncritical part of shear viscosity) $η\_{0}=0.684$ cP, the Debye momentum cutoff $q\_{D}=0.786 Å^{-1}$ and the MCT constant A = 0.050. The intermolecular force range L of water and phenol molecules in a binary mixture has been calculated to be 11.17$ Å$. The large value indicates that the mutual force between binary mixture molecules can be considered as a week attractive force. The critical amplitude of specific heat under constant pressure at critical concentration and above critical temperature $C\_{pc}$ has been found to be $259.16\frac{J}{kg.K}$ by using the two scale factor university.