High Pressure Dielectric Studies of a Substance with the Smectic A\textsubscript{1} Phase

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The results of dielectric studies of 5-\textit{n}-hexyl-2-(4′-isothiocyanato)-1,3-dioxane (6DBT) in the smectic A\textsubscript{1} phase at pressures up to 150 MPa and temperatures up to 340 K are presented. The low frequency relaxation time $\tau$ yields the activation volume $\Delta^\#V = RT(\partial \ln \tau / \partial p)_T$ and activation enthalpy $\Delta^\#H = R(\partial \ln \tau / \partial T^{-1})_p$. The calculated values of these parameters are compared with those obtained recently for \textit{n}-octyl-cyanobiphenyl (8CB) forming the smectic A\textsubscript{d} phase. In the case of 6DBT both these quantities are practically constant, whereas those for 8CB decrease, when going away from the phase transitions isotropic – smectic A\textsubscript{1} (6DBT) or nematic – smectic A\textsubscript{d} (8CB). These differences support our earlier conclusion that increase of pressure leads to a breaking of the antiparallel associations of cyanobiphenyl molecules in the smectic as well as in the nematic phases.

\textit{Key words:} Liquid Crystal; Smectic A, Dielectric Properties, High Pressure.