

Conclusions

(1) In the rotational isomeric molecules of 1,2-disubstituted ethanes, the heat of activation for dielectric relaxation as obtained from the present investigations is found in each case to be approximately equal to the difference in the electrostatic potential energies of the polar rotamers in the liquid state. This electrostatic potential energy difference as shown by Mizushima¹ and Wada² to be equal to the amount of lowering of energy difference between the trans and gauche isomers from the gaseous to the liquid state in the case of 1,2-dihaloethanes was also true to other 1,2-disubstituted ethanes studied in the present investigations.

(2) The energy difference between the trans and gauche isomers of 1,2-disubstituted ethanes in the liquid state as obtained in the present investigations from the measurement of mean dipole moment at different temperatures, agree well with those reported in literatures obtained from spectroscopic studied.

(3) The heat of activation for dielectric relaxation in the 1,2-dihaloethanes and 1,2-dihalopropanes as obtained in the present investigations is in each case less than 1.5 k.cal/mole which is much less than the value of the potential barrier to internal rotation lying in the range 3 - 12 k.cal, in these disubstituted ethanes reported in literature from ultrasonic absorption studies³. So the heat of activation for in the present cases has been attributed to the dipolar orientation of the molecule as a whole rather than the internal rotation of the CH₂X-group about the carbon carbon single bond as axis.

(4) The heat of activation for dielectric relaxation in the liquids obtained in the present investigation is less than that of the heat of activation for viscous flow as is generally observed in dielectric studies. Since the viscous flow requires energy for translation as well as for rotation while in dielectric relaxation requires energy only for rotation.

R e f e r e n c e s

1. S. Mizushima, "Structure of molecule and internal rotation", Academic Press Inc., New York, 1955, p. 42.
2. A Wada, J. Chem. Phys., 22, 198 (1954).
3. T. H. Thomas, E. Wyn-Jones and W. J. Orville - Thomas, Trans. Faraday Soc., 65, 975 (1969).