In deriving equation (22), we have neglected $\alpha_2^2 \epsilon^2$ and have used the expansions of Bessel functions for small arguments[5]. The equation (22) gives the dispersion relation which consists of an infinite number of sets present in it. Since, $\alpha_2 \epsilon$ is very small, the above equation can further be simplified to

$$J_1(\alpha_1 a) - 0.5\alpha_1 a J_0(\alpha_1 a) = 0 \ , \qquad (23)$$

$$\text{where} \quad \alpha_1 a = \left\{ a\gamma \left(\frac{p^2}{\gamma^2 C_{ta}{}^2} - 1 \right)^{\frac{1}{2}} \right\} \qquad (24)$$

The values of α_1 a are given by[5] 5.1356, 8.4172, 11.6198, 14.7960

Thus the frequency of torsional waves through muscle can be determined.

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PULSED NMR STUDIES OF MOLECULAR REORIENTATION IN CH_3NH_3I

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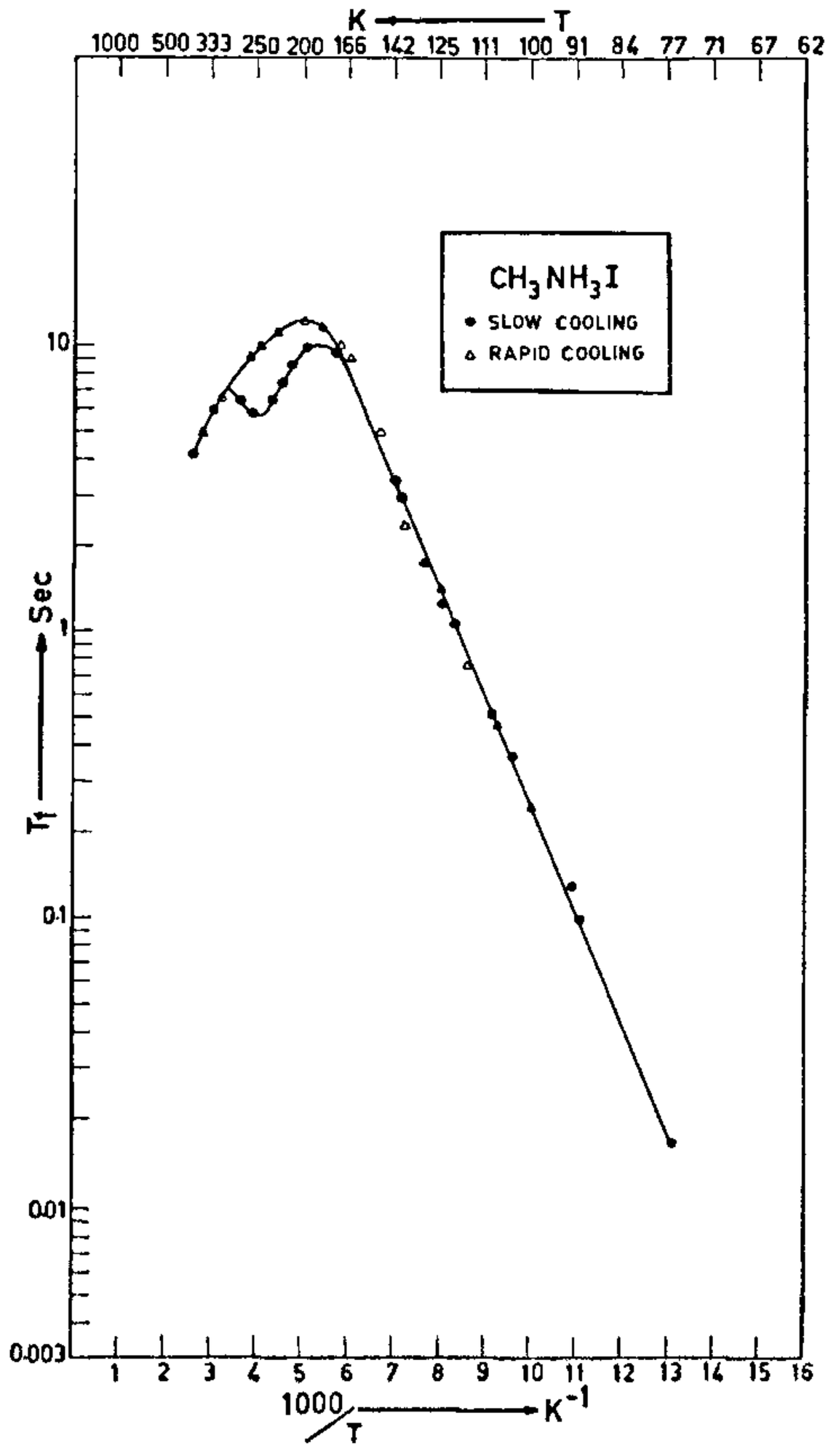
MONO methyl ammonium halides CH_3NH_3X where X = F, Cl, Br or I form an interesting family of compounds with diverse molecular motions of CH_3 and NH_3 groups. One of the members of this family CH_3NH_3I is reported to undergo structural phase transitions at 295 K[α phase] and 83 K[δ-phase] as indicated by IR studies[1,2]. But ^{127}I NQR investigations[3] show evidence of a phase transition[phase] at 166 K. CH_3NH_3I is bimolecular [Z = 2] with tetragonal structure [$a_0 = 5.11$ A; $C_0 = 8.97$ A] having a space group D_{4h}^1(P 4/nmm)[4]. In this compound the C-N bond of $CH_3NH_3^+$ coincides with the fourfold crystallographic axes. Since the cations have threefold symmetry C_{3v} along the C—N bond, they must be either orientationally disordered or freely rotating. Torsional and librational modes of the cation have been determined by inelastic neutron scattering studies[5]. We have carried out proton spin-lattice relaxation measurements in CH_3NH_3I and its N-deuterated derivative CH_3ND_3I in the temperature range 77–420 K to obtain possible information about the kinetics of motion of CH_3 and NH_3 molecular groups and their connection to the observed phase transitions. These measurements have been carried out on a home-made solid state pulsed NMR spectrometer working at a Larmor frequency of 10 MHz[6].

The temperature dependence of T_1 in CH_3NH_3I shown in the figure depends very much on the way the sample is cooled. When the sample is slowly cooled from room temperature or slowly warmed up to room temperature from the lowest temperature, the behaviour obtained is the same and is indicated by closed circles. If the specimen is quenched by sudden cooling to liquid nitrogen temperature and allowed to warm up gradually to room temperature, the T_1 variation



resulted, is indicated by triangles in the same figure. It is evident that the nature of variation of T_1 due to slow cooling and by quenched cooling is different in certain region of temperature. However quenched samples revert back to normal behaviour within an interval of 12 hr and measurements carried out later on slow cooling are reproducible. In slow cooling T_1 increases monotonically and reaches a maximum at 175 K, then decreases and reaches a maximum again at 295 K. On the other hand quenched specimen showed only one broad maximum around 200 K. However both behave similarly from 77 K upto 166 K. Again above 295 K, the behaviour is the same, independent of the history of the sample. The different T_1 behaviour between 166 K and 295 K could be attributed to the phase transitions at 166 K and 295 K. No minima is observed in T_1 in protonated specimen down to 77 K.

In CH_3ND_3I also no minimum in T_1 is found. It increases monotonically with temperature from 77 K to 170 K. Measurements could not be taken beyond this temperature due to the poor signal-to-noise ratio and long T_1 value.

The activation energies calculated for CH_3NH_3I and CH_3ND_3I are 1.69 and 1.38 Kcal/mol respectively. The small activation energies suggests that both CH_3 and NH_3 groups undergo rapid reorientation even at low temperature. These observations are supported by second moment[7] measurements which gave low values even at 77 K for both CH_3NH_3I and CH_3ND_3I. The classical BPP type T_1 min for CH_3 group reorientation is likely to occur below 77 K and this indicates that proton tunnelling may be present. The observed small second moments even at 77 K support this view.

The observation of different T_1 behaviour from 166 K onwards is due to different phases of the specimen. IR studies suggest that the charge distribution around cation is different in the two phases. This could give rise to different potential barriers and hence the diverse T_1 behaviour in this temperature region. The phase transition at 166 K therefore seems to be connected with the reorientational motion of CH_3 and NH_3 groups. Similar behaviour has been observed in chloride[8] and bromide compounds[9] also.

Further investigations are in progress and the detailed analysis of the results will be published later.

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INDUCTION OF CROWNGALL TUMOR ON *VIGNA SINENSIS* (LINN.) SAVI AND STUDIES ON NUCLEIC ACID SYNTHESIS IN ISOLATED GALL NUCLEI

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CROWNGALL disease in plants is of great importance because of its close association at cellular level with animal cancer[1]. Smith and Townshend[2] found that the crowngall disease in plants can be inoculated with a gram-negative bacteria *Agrobacterium tumefaciens*. *A. tumefaciens* shows considerable variation in host susceptibility and virulence[2]. In the present investigation we report the induction of the disease into *Vigna sinensis* (Linn.) Savi a new host by this pathogen. Also, a comparison of nucleic acid synthesis has been carried out by isolating nuclei from the normal and gall tissue of the host.

Seeds of *Vigna sinensis* (Linn.) savi were germinated for 48 hr[3] and then planted to get young seedlings (10–20 cm tall) for inoculation with *A. tumefaciens* (Kerr 14). *A. tumefaciens* TIP Kerr 14 stock culture was maintained in a medium containing 0.5% yeast extract, 0.8% bactotryptone, 0.5% sodium chloride, 2% agar at 4° C in a BOD incubator[4]. For inoculation in the host seedlings the bacterial culture was transferred into a liquid medium at pH 7, incubated at 25° C for 24 hr to attain logarithmic growth phase[4,5]. Two week-old seedlings were the best susceptible host for infection. The nodal portion of the host stem was sterilized with cotton wool soaked in ethyl alcohol and fresh wounds were made by piercing with a sterile needle. Then incoluation was done either with a loopful or with 1 ml of the bacterial culture from lagarithmic phase (approx. 2.0237×10^9 bacterial cells). The injected plant was kept in the dark at 25° C for 24 hr and then transferred to room temperature[6].

Figure 1 represents the view of the inoculated plant after 18 days of inoculation with one loopful culture of *A. tumefaciens* (K. 14). A typical tumor developed at the inoculation site characterized by its rough surface and unorganized growth. Figure 2 represents the view of the plant after 20 days of inoculation with 1 ml