

MEASUREMENTS IN DNA MOLECULES USING PERTURBED ANGULAR CORRELATION SPECTROSCOPY

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ABSTRACT

The perturbed angular correlations (PAC) spectroscopy has been used to study the DNA, using ^{111}In (^{111}Cd) probe nuclei. The biological molecules studied were DNA of different mice lineages (A/J, C57BL/6, B6AF1, BXA1 and BXA2) infected by the strain of *T. cruzi*. This parasite may cause the Chagas disease when transmitted to humans. One of the advantages of applying PAC technique to biological molecules is that the experiments can be carried out on molecules in aqueous solution, approaching the function of molecules under conditions that are close to in vivo conditions. The samples were measured at the room (295K) and liquid nitrogen (77K) temperatures in each case. The samples measured at room temperature showed dynamic interaction with fast relaxation of the quadrupolar interaction A/J ($\lambda = 22.3$ MHz); C57BL/6 ($\lambda = 8.70$ MHz); B6AF1 ($\lambda = 8.85$ MHz); BXA1 ($\lambda = 18.02$ MHz) and BXA2 ($\lambda = 15.93$ MHz), resulting in an exponential decay of the PAC spectra. The samples measured at the liquid nitrogen temperature on the other hand showed quite slow relaxation ($\lambda \sim 0$) of the quadrupolar interaction or only static interactions as expected at low temperatures: A/J ($\nu_Q = 141.97$ MHz; $\eta = 0.39$); C57BL/6 ($\nu_Q = 147.69$ MHz; $\eta = 0.37$); B6AF1 ($\nu_Q = 147.68$ MHz; $\eta = 0.34$); BXA1 ($\nu_Q = 217.34$ MHz; $\eta = 0.28$) and BXA2 ($\nu_Q = 221.82$ MHz; $\eta = 0.19$). The results showed, qualitatively, the existence of dynamic interactions between biomolecules and the probe nuclei. A systematic variation of the rotational diffusion parameter was observed that depends on the type of molecule and the sample temperature, showing that probe nuclei were in fact bound to the biomolecules.