

W-AM-C10 MOTIONAL PROPERTIES OF SPIN LABELS IN PROTEINS: EFFECTS OF HYDRATION

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Conventional and saturation transfer ESR techniques are used to study the motional properties of several spin labels introduced in three proteins: lysozyme, sperm whale myoglobin and human hemoglobin. The mobilities of a maleimide spin label which binds covalently to the proteins, as well as of two small probes TEMPO and PD-TEMPOL were monitored in the temperature range -10°C to -150°C for samples in the dry and solution states. The three proteins show a similar temperature dependence as indicated by the parameters $2A_{zz}$ and ΔH . A small linear increase in $2A_{zz}$ with the decrease in temperature is observed for the dry samples. For the proteins in solution, on another hand, the $2A_{zz}$ temperature dependence shows a change of behavior around -60°C which is related to the freezing of the water molecules in the hydration shell. The changes observed for the parameter ΔH are such that at temperature below -60°C ΔH is greater for the solution sample while at temperatures above -60°C ΔH is greater for the dry sample. ST-ESR measurements show that the motion of the spin label is very restricted in all systems ($\tau > 10^{-5}$ sec) in the temperature range studied, so that the residual librational motion of the label is sensitive to the hydration being responsible for the observed changes of the ESR parameters with temperature.

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