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Investigating the Disordered States of Two Proteins Using Intramolecular Contact Formation VIJAY SINGH, MICHAELA KOPKA, YU-JIE CHEN, WILLIAM WEDEMEYER, LISA LAPIDUS, Michigan State University
— Using the quenching of the triplet state of tryptophan by cysteine, we investigate the unfolded states of two structurally similar but sequentially non-homologous proteins, the IgG binding domain of proteins L and G, under a range of denaturing conditions. These proteins show remarkably similar dynamics of intramolecular diffusion marked by a decrease in contact formation at denaturant conditions that favor folding. A reaction limited rate and the diffusion limited rate are obtained by measuring the viscosity dependence of the intramolecular contact rate. To further investigate the polymer dynamics of the unfolded state under folding conditions, we modeled the proteins as a worm-like chain with excluded volume using Szabo, Schulten and Schulten (SSS) theory to estimate the effective persistence length and intramolecular diffusion constant at various concentrations of GdnHCl. The results reveal an unfolded state under folding conditions that is significantly more compact and less diffusive than the fully denatured state.

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