lar reaction mechanism. The measured forward reaction rate constants (10^7 – 10^8 $M^{-1}s^{-1}$) are too large to permit a mechanism in which IDA reacts with pre-existing kinks that occur transiently at a small fraction (less than 10^{-2}) of the DNA base pairs. The equilibrium constant calculated from the ratio of the forward and reverse binding rate constants agrees well with results obtained from equilibrium dialysis. Although the extent of hyperchromicity induced in DNA due to IDA binding is similar for DNAs from calf thymus and *M. luteus*, the activation energies and reaction enthalpies are clearly different. For example, the binding enthalpy change is 14 kcal mol^{-1} for *M. luteus* DNA, and only about 4 kcal mol^{-1} for calf thymus DNA.

Our observations are generally consistent with the β-kinked structure for the complex as proposed by Sobell et al., but differences, presumably sequence-dependent, must exist in the detailed mode of binding to DNAs from different sources.

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OPTICAL DETECTION OF COMPRESSIBILITY DISPERSION

RELAXATION KINETICS OF GLUTAMATE DEHYDROGENASE SELF-ASSOCIATION

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Pressure perturbation techniques of chemical relaxation exploit the augmented compressibility arising from the finite ΔV for the chemical process being observed. Compared to temperature jump, pressure jump suffers from a greatly decreased sensitivity of the chemical system to the perturbation. A sinusoidal pressure perturbation (traveling sound wave) allows phase-sensitive detection and time-averaging of the response ("stationary method" of Eigen and deMaeyer), thereby enhancing the signal-to-noise ratio. A finite relaxation time manifests itself as a phase shift of the response relative to the perturbation, and the signal can then be decomposed into the in-phase and quadrature components. The quadrature or imaginary part of the signal is directly proportional to $\omega\tau/\{1 + (\omega\tau)^2\}$, where ω is the angular frequency and τ is the relaxation time. Measuring the frequency dependence (dispersion) of the imaginary compressibility reveals a maximum at $\omega = 1/\tau$. Measurements of the real component at frequencies remote from the relaxation region (both above and below) permit the determination of ΔV for the process in question.

An instrument has been built to measure the kinetics of subunit self-association reactions by monitoring the intensity of light scattered at 90° (proportional to weight-average molecular weight). Although relative volume changes are small (change in partial specific volume is typically 10^{-3} ml/g), the relevant thermodynamic parameter is the difference between the molar volumes of products and reactants. These differences tend to be large (50–100 ml/mol of subunit), making this experimental approach feasible. Sinusoidal pressure perturbation of 3 atm amplitude is achieved with a stack of piezoelectric ceramic elements. Lamp noise and static light scattering are removed by subtracting the output from a beam splitter-reference photomultiplier tube combination. The signal is then processed by a home-built phase-sensitive detector and gated integrator. The instrument displays the real and quadrature components of the light-scattering signal as the frequency is varied from 0.0005 ($\tau \simeq 300$ s) to 30 kHz ($\tau \simeq 5\,\mu$s). Frequencies above 150 Hz ($\tau < 1$ ms) are not currently accessible.

Measurements on the kinetics of the indefinite linear self-association of bovine liver glutamate dehydrogenase will be compared with literature values

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CREATION OF A NONEQUILIBRIUM STATE IN SODIUM CHANNELS BY A STEP CHANGE IN ELECTRIC FIELD

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Voltage clamp of electrically excitable membranes can be considered an E jump, in which the macromolecules associated with the specific ion conductance changes are subjected to a sudden change in electric field of up to approximately 10^7 V/m. If the conductance and activatability of the channels are taken as measures of the populations of different states of the gating molecules, then at any constant voltage the potassium conductance gates are distributed between two states (conducting and nonconducting), while the sodium conductance gates are distributed among three states (conducting, activatable, and inactivated). Kinetic analysis of the sodium conductance changes, taking into account the phenomena of inactivation shift and τ_c-τ_h separation (anomalous with respect to the Hodgkin-Huxley model), suggests that a fourth state, which has no population at rest, may be the direct precursor of the conducting state (1). In this paper a physical model of the fourth state is suggested. The fourth state may consist of a non-Boltzmann distribution of gating molecule conformations and orientations relative to the energy minima that characterize the steady state at any particular value of average electric field. This state might be created when the electric field changes too rapidly for gating molecule orientation and conformation to