Structural Effects in Proteins

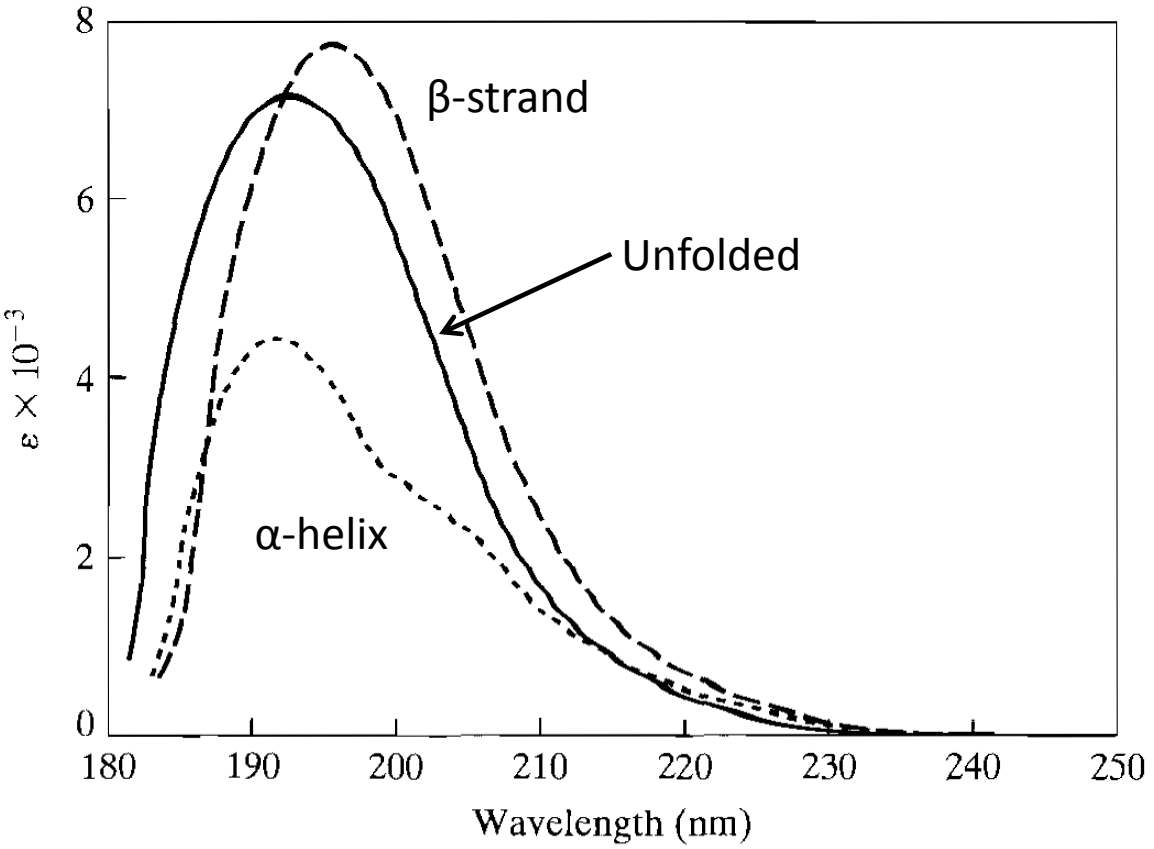


Figure 9.16 The electronic absorption spectra for poly-L-lysine hydrochloride in aqueous solution as a random coil at pH 6.0, 25°C (—); α helix at pH 10.8, 25°C (---); β strand at pH 10.8, 52°C (– –). [Adapted from K. Rosenheck and P. Doty (1961), *Proc. Natl. Acad. Sci. USA* **47**, 1775–1785.]

Structural Effects in DNA

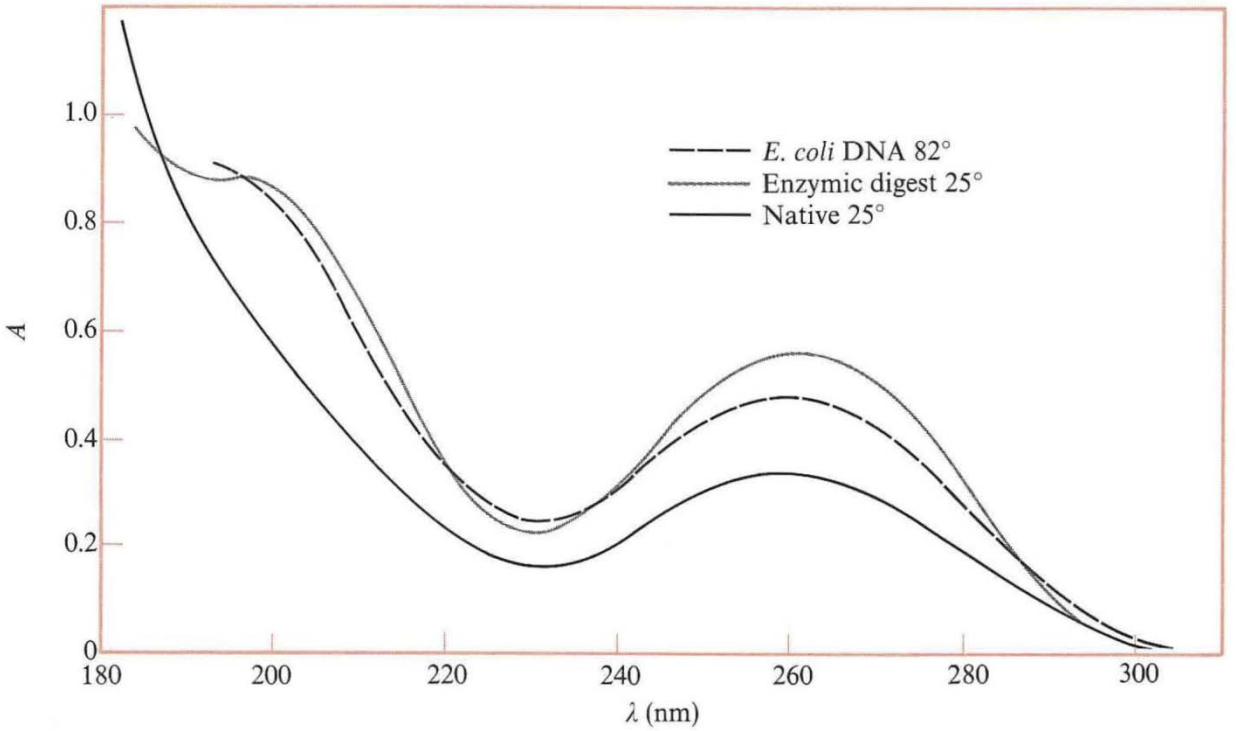
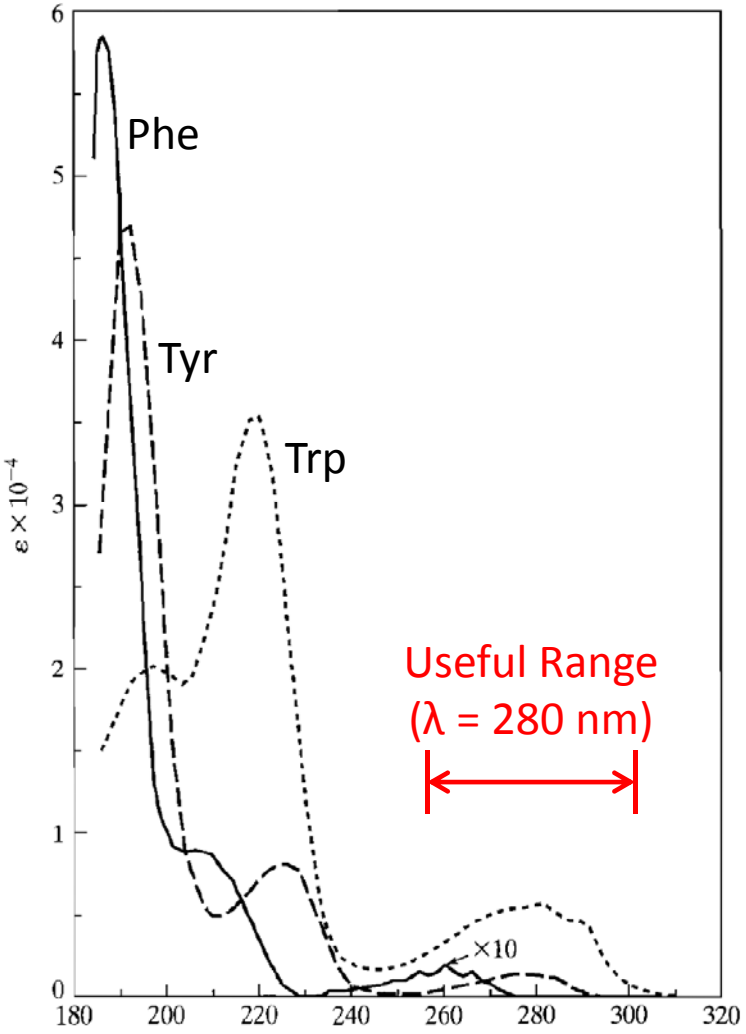


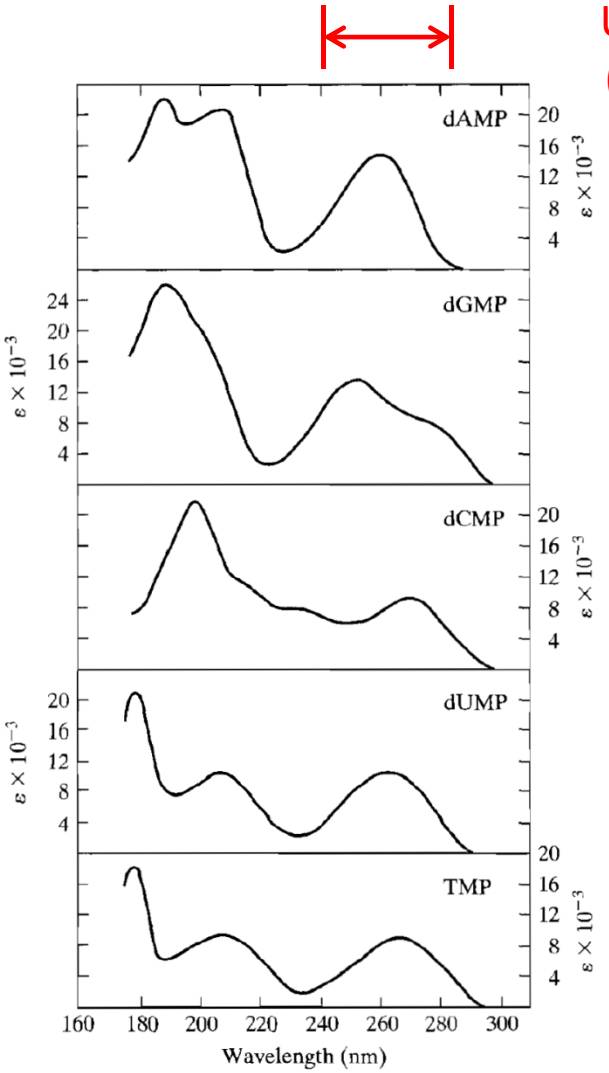
Figure 7-14

Spectrum of DNA as a function of temperature. The enzymic digest should result in a solution of only mononucleotides and possibly a few short oligomers. Note that the high-temperature spectrum is fairly close to the digested spectrum. [After D. Voet, W. B. Gratzer, R. A. Cox, and P. Doty, *Biopolymers* 1:193 (1963).]

From *Biophysical Chemistry, Part II*
Cantor & Schimmel, Chapt. 7, p. 384

Concentration of DNA and Protein





Websites for Estimating Ɛ

- Proteins
  - ProtParam
    http://web.expasy.org/protparam/
- DNA (Double and Single Stranded)
  - IDT Biophysics
    http://biophysics.idtdna.com/UVSpectrum.html
  - Crude Ɛ for ds plasmid DNA: 0.02 $\left(\frac{\mu g}{mL}\right)^{-1} cm^{-1}$
- RNA
  - Harder to estimate, because of structure, but see
    http://www.scripps.edu/california/research/dna-protein-research/forms/biopolymercalc2.html

Solvent Effects

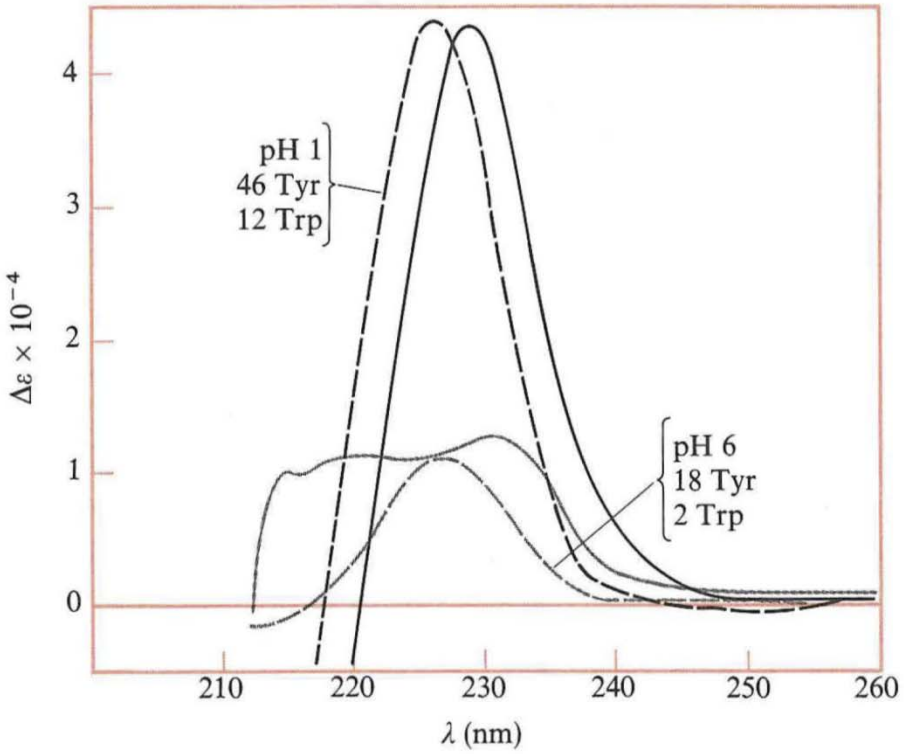


Figure 7-16

Solvent-perturbation difference spectrum, produced by treating rabbit-muscle aldolase with 20% ethylene glycol. The observed spectra (*solid curves*) are compared with calculated difference spectra (*dashed curves*) generated using data obtained on individual amino acids. Clearly, the protein has many fewer exposed aromatic groups at pH 6 than it does at pH 1. [After J. W. Donovan, *J. Biol. Chem.* 244:1961 (1969).]

From *Biophysical Chemistry, Part II*
Cantor & Schimmel, Chapt. 7, p. 389

IR Spectroscopy

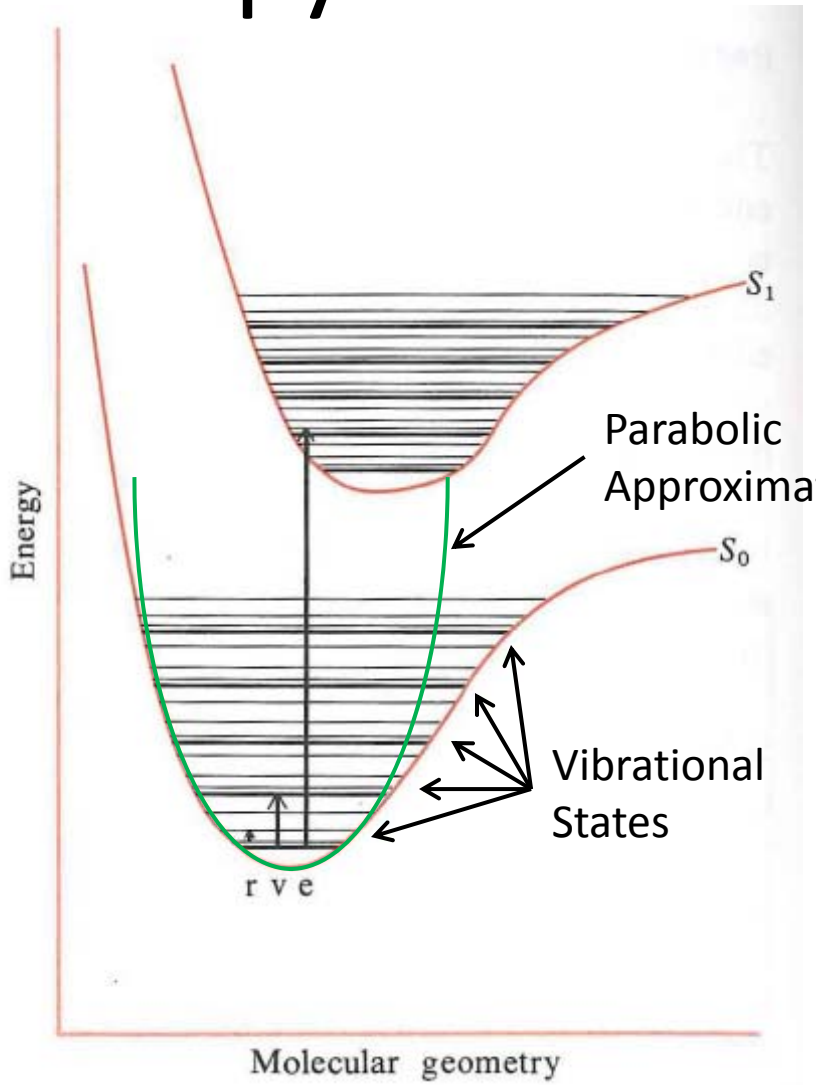


Figure 7-1

Energy levels of a small molecule. Selected rotational sublevels of the vibrational levels of each of two electronic states are shown. Transitions corresponding to electronic (e), vibrational (v), and rotational (r) spectra are indicated.

From *Biophysical Chemistry, Part II*
Cantor & Schimmel, Chapt. 7, p. 362