



The pressure-temperature phase diagram of hen lysozyme at low pH

<http://www.firstlight.cn> 2009-03-11

The equilibrium unfolding of hen lysozyme at pH 2 was studied as a function of pressure (0.1~700 MPa) and temperature (-10°C ~ 50°C) using Trp fluorescence as monitor supplemented by variable pressure ^1H NMR spectroscopy (0.1~400 MPa). The unfolding profiles monitored by the two methods allowed the two-state equilibrium analysis between the folded (N) and unfolded (U) conformers. The free energy differences $\Delta G (=G_U - G_N)$ were evaluated from changes in the wavelength of maximum fluorescence intensity (λ_{max}) as a function of pressure and temperature. The dependence of ΔG on temperature exhibits concave curvatures against temperature, showing positive heat capacity changes ($\Delta C_p = C_{pU} - C_{pN} = 1.8 - 1.9 \text{ kJ mol}^{-1} \text{ deg}^{-1}$) at all pressures studied (250~400 MPa), while the temperature T_S for maximal ΔG increased from about 10°C at 250 MPa to about 40°C at 550 MPa. The dependence of ΔG on pressure gave negative volume changes ($\Delta V = V_U - V_N$) upon unfolding at all temperatures studied (-86 ~- 17 ml mol^{-1} for -10°C ~ 50°C), which increase significantly with increasing temperature, giving a positive expansivity change ($\Delta\alpha \sim 1.07 \text{ ml mol}^{-1} \text{ deg}^{-1}$). A phase-diagram between N and U (for $\Delta G=0$) is drawn of hen lysozyme at pH 2 on the pressure-temperature plane. Finally, a three-dimensional free energy landscape (ΔG) is presented on the p-T plane.

[存档文本](#)