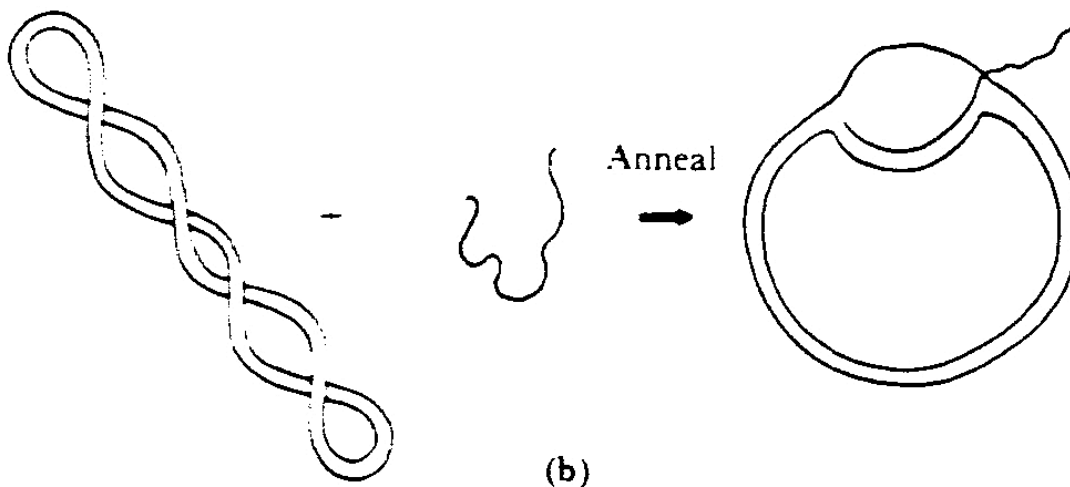
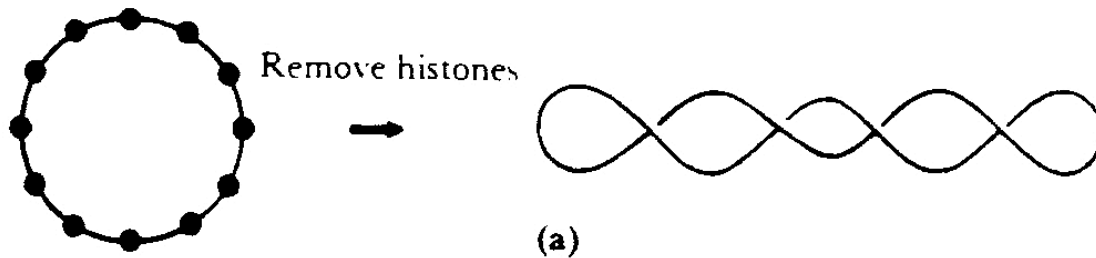


Exercise 4: DNA properties

1. A solution of double-stranded DNA is heated then cooled to room temperature over a 2 minute interval. How will the absorbance at 260 nm change during cooling under the following conditions?

- a. The solution is initially heated to just below T_m .
- b. The solution is initially heated to well above T_m .

2. a. DNA from the animal virus SV40 is a covalently-closed, circular duplex. Under certain conditions, it can be isolated from virus or infected cells in association with histones. In the electron microscope, the DNA-histone aggregate appears as a circle of nucleosomes. However, when the histones are removed, the naked DNA forms right-handed supercoils (see the figure (a) below). From this information, determine whether the primary helix in a native SV40 DNA molecule is underwound or overwound, and deduce the handedness if the toroidal coiling of DNA around nucleosomes.



b. If the naked, supercoiled DNA from SV40 is mixed with single-stranded SV40 DNA under reannealing conditions, displacement loops (D-loops) form (see figure (b) on the previous page). That is because supercoiled DNA is in a higher energy state than non-supercoiled DNA. The potential energy associated with supercoiling drives the uptake of exactly enough single-stranded DNA to remove all supercoils. Explain why the uptake of single strands removes right-handed interwound supercoils.

3. Explain why RNA is hydrolyzed by alkali, whereas DNA is not.