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Force, work and heat in rubber elasticity:

1. A double stranded DNA molecule was stretch 5 μm by a force of 2 pN, using optical tweezers at a temperature of 300 K. Double stranded DNA has a $b_k = 100 \text{ nm}$ and each nucleotide measures .35 nm.

- a) How long is this sequence?
- b) How much work was required to pull this molecule?
- c) If this process is reversible how much heat was transferred to or from the DNA?
- d) If the process if isothermal, what is the entropy change?