

Midterm Exam Moc/Bio (2006)

1. (5pts) From a chemical point of view what distinguishes biological systems from inorganic systems.
2. (3pts) List three common CHEMICAL reactions of nucleic acids.
3. Given the following protein sequence: Trp-Asp-Tyr-Pro-Leu-Lys-Met-Phe-Glu.
  - a. (5pts) Write a corresponding RNA sequence that encodes for this protein?
  - b. (5pts) Write the DNA equivalent?
  - c. (5pts) What is the minimal number of DNA bases that would need to be changed to mutate the single Pro to an Asp.
5. (8pts) You have just purchased an old DNA synthesizing instrument. You find that when you use this instrument the coupling efficiency is only 89%. In addition the deprotection step is only 92% efficient. You need 1 micromole of DNA that is 30 nucleotides long for your gene chip experiment. What is the MINIMUM number of micromoles of starting base linked material needed to ensure that you have enough material for your gene chip? (assume that all other chemical step besides coupling and deprotection are 100% efficient).
6. (5pts) Explain SELEX and how this can be used to obtain a high affinity nucleotide molecule?
7. (6pts) Explain the three steps of the polymerase chain reaction (PCR) and what they achieve?
8. (8pts) The figure below illustrates the TMV that was used as a template to make nanowires. Name the three areas designated by the arrows, the mutation that was introduced, and why?

