

Midterm Exam Moc/Bio

1. Name the four principle atomic elements of biological systems?
2. From a chemical point of view what distinguishes biological systems from inorganic systems.
3. List three chemical reactions of nucleic acids
4. Given the following protein sequence: Trp-Asp-Tyr-Pro-Leu-Lys-Met-Phe-Glu.
 - a. Write a corresponding RNA sequence that encodes for this protein?
 - b. Write the DNA equivalent?
 - c. What is the minimal number of DNA bases that would need to be changed to mutate the single Pro to an Asp.
5. 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. Explain SELEX and how this can be used to obtain a ?
7. Explain the three steps of the polymerase chain reaction (PCR) and what they achieve? What is "capping" in DNA and protein chemical synthesis and why is this done?
8. The figure below illustrates the ATPsynthase that was use to create a nanomolecular rotor. Name the mutations (labeled 1-4) that were introduced into the protein and why?

