

Name _____

Score _____

Exam 3, BICH 440 Honors, Monday, November 22, 2004

You **MUST** sign the following academic integrity statement:

On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work. Signed: _____

Write concise answers to demonstrate effectively your mastery of the subject. Show your work in order to receive maximum credit where applicable.

gas constant R 8.315 J/mol-K

Faraday constant F 96.5 kJ/mol-volt

- 1) (12 pts) Draw the mechanism of Ribonuclease A. You will need to show the phosphodiester backbone of the RNA substrate at the cleavage site, the sidechains of the two important active site residues of the enzyme that are involved in catalysis, and the movement of protons and electrons in the reaction.

2) (12 pts) Draw the structures of deoxyguanosine and deoxycytidine at pH 7 when oriented in a standard Watson-Crick base-pair. Clearly indicate the hydrogen bonds with dotted lines.

3) (7 pts) What is meant by the steady state assumption in Michaelis-Menten enzyme kinetics? Write out the rate equation used to derive the Michaelis-Menten equation that describes the steady state assumption for a simple single substrate reaction catalyzed by an enzyme. Assume you are dealing with the initial stages of the reaction.

4) (6 pts) Name the six general classes of enzymes according to the international classification scheme.

5) (12 pts) Given the following double-stranded fragment of DNA:

5' -CCAGTTGGCGTAAAGCTGATCCCAGAGTTGATC-3'

3' -GGTCAACCGCATTTCGACTAGGGTCTCAACTAG-5'

Using the oligonucleotide primer, 5' -GTTGGCGTAAAGCTGATC-3', write the sequence of ALL the DNA fragments that would be generated in each reaction after adding DNA polymerase and the following sets of nucleotides. You do not have to write the sequence of the primer for each DNA fragment - just write "primer."

- a) dGTP, dATP, dTTP, dCTP (1 mM of each); plus ddGTP (0.03 mM)
- b) dGTP, dTTP, dCTP (1 mM of each); plus ddTTP (0.03 mM)
- c) dGTP, dCTP, dATP, ddTTP (1 mM of each)

6) (4 pts) Name two examples of ribozymes.

7) (9 pts) Fill in the following table to differentiate parameters of A, B and Z forms of DNA:

type of DNA	handedness of helix	approx. # of bp/turn	bp significantly tilted relative to axis? (yes or no)
A form			
B form			
Z form			