

Chemistry 224
Bioorganic Chemistry
Exam 3

Name _____
Tuesday, Dec. 19, 2000
100 points

This Exam is closed book and closed notes

Please show all your work!

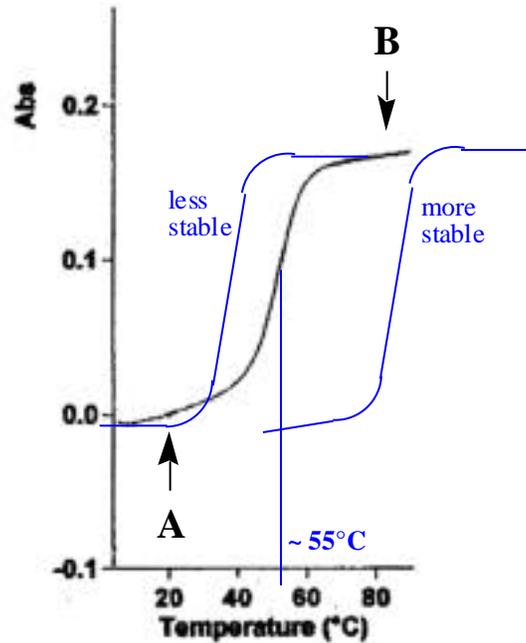
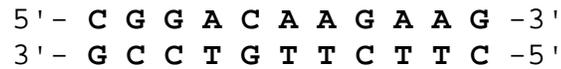
Stereochemistry counts as indicated!

Neatness counts!

It has been a pleasure,
Good Luck!!

Happy Holidays!
Ho ! Ho! Ho! etc.

1. Below is a DNA melting curve for the following sequence:



a. Describe the structure of the DNA at the points labeled A and B on the melting curve. (5 pts)

A is double stranded DNA

B is single stranded DNA (melted)

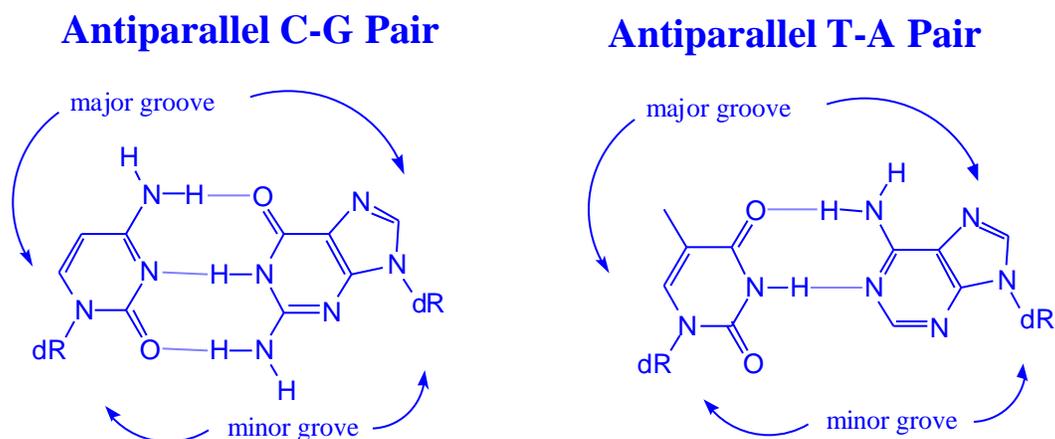
b. From the melting curve shown above, what is the approximate melting temperature of the DNA? Please show how you arrived at this number. (5 pts)

~ 55 °C (see above)

c. On the diagram above, draw and label melting curves for DNA more stable and less stable than the one shown. (5 pts)

see above

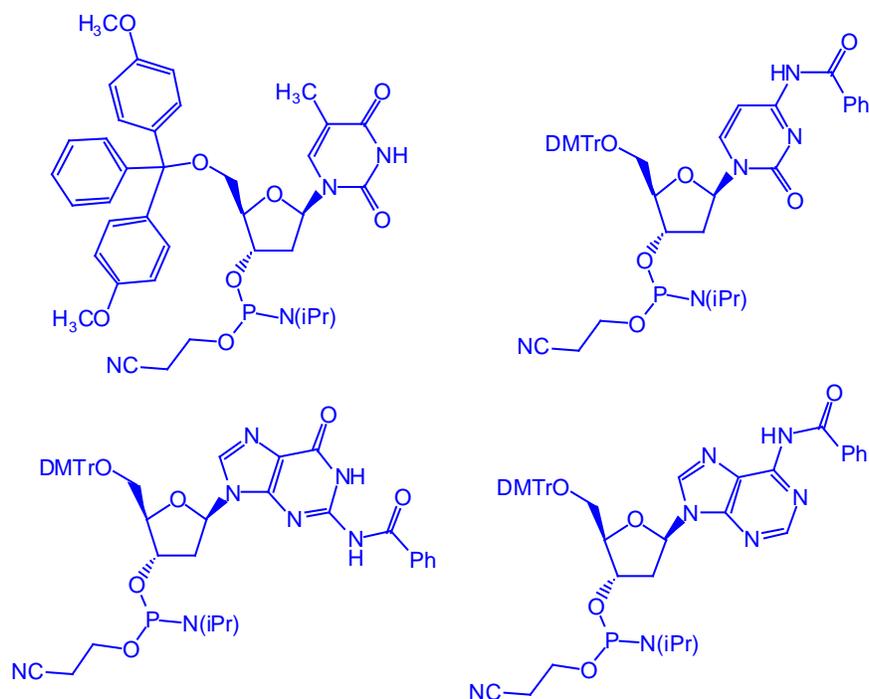
2. a. Draw the Watson-Crick hydrogen bonds of the DNA bases. You may use dR for the deoxyribose unit. (10 pts)



- b. On each W-C pair, show the location of the major and minor grooves. (5 pts)

see above

3. For one pyrimidine and one purine, draw a suitable reagent for solid phase DNA synthesis. Do not abbreviate any part of the structures. (10 pts)

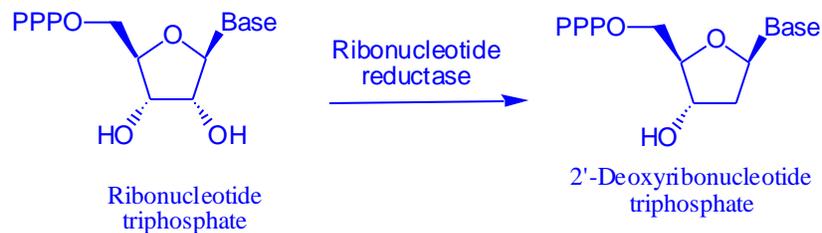


4. What enzyme is used in polymerase chain reaction (PCR). What is the function of this enzyme and what unique feature does it possess that is critical for the success of PCR. (10 pts)

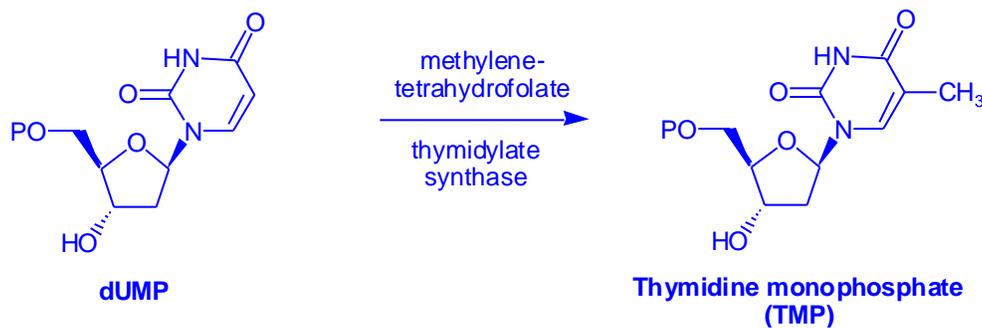
Taq or Pfu, are DNA polymerases and are responsible for the replication of a single stranded template DNA starting from a complimentary primer. These particular polymerases have the unique feature of being stable and active at elevated temperature, which is critical for the success of PCR.

5. Show the reactions carried out by the following enzymes during nucleotide biosynthesis. (10 pts)

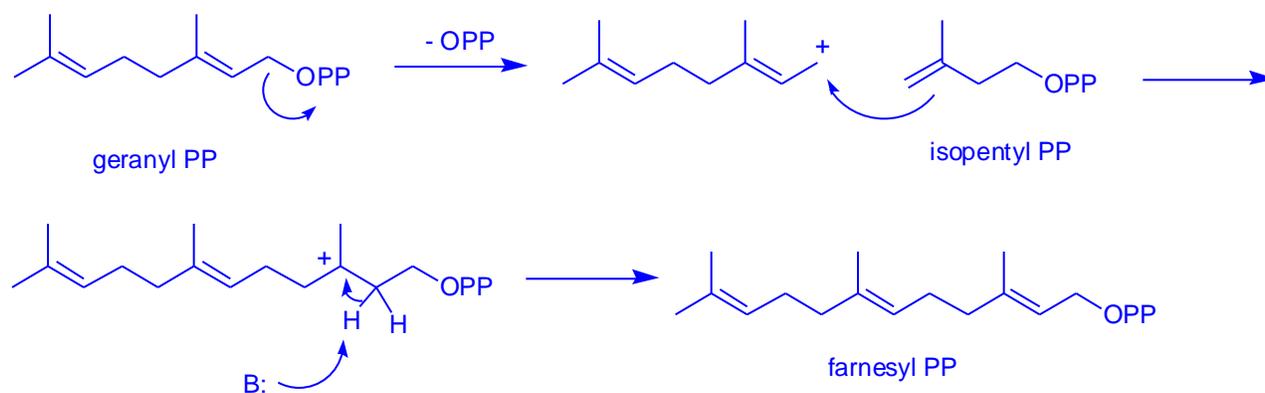
- a. ribonucleotide reductase



- b. thymidylate synthase

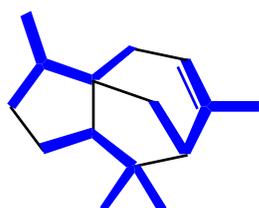


6. Give the mechanism for the conversion of geranyl pyrophosphate to farnesyl pyrophosphate. (10 pts)

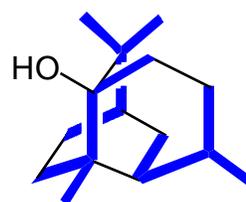


7. Identify the isoprene units in the following isoprenoid derived natural products. (10 pts)

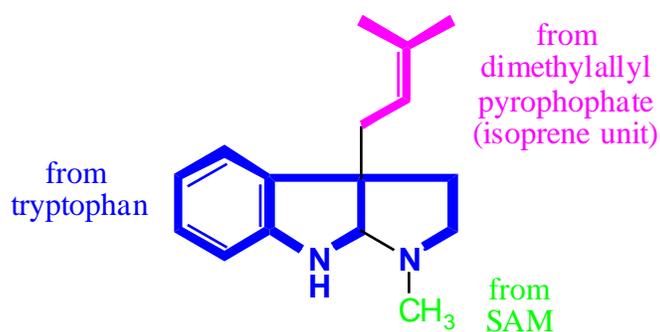
a. cedrene



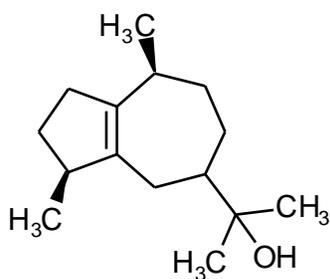
b. patchouli alcohol



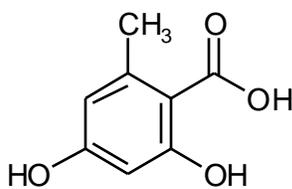
8. Consider the alkaloid shown below. Show the biosynthetic precursors that account for all carbon and nitrogen atoms. (10 pts)



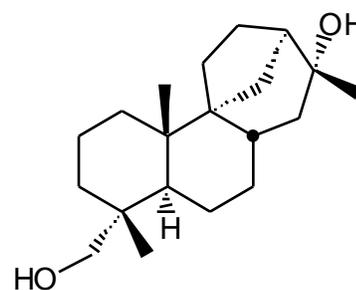
9. Classify the following natural products as a terpene, sesquiterpene, diterpene, steroid, polyketide, or alkaloid. (10 pts)



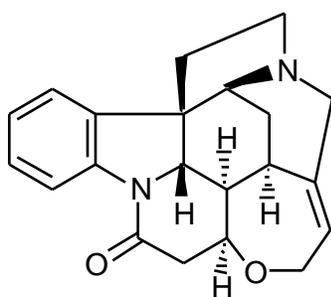
sesquiterpene



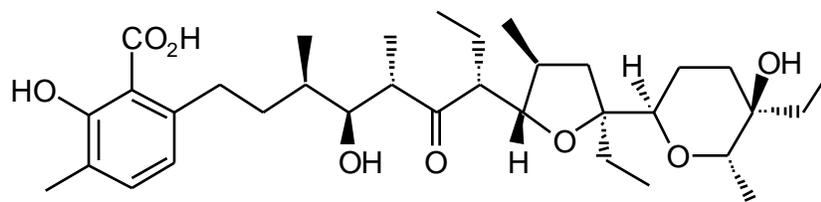
polyketide



diterpene



alkaloid



polyketide