

S.C. Hartsel
Chem 452, '00 100 pts
Green

NAME _____
EXAM 2

1. *Antisense* RNA is a very promising, but still controversial possible anticancer treatment. One version of the treatment works by introducing chemically stabilized RNA that is complimentary to part of the target mRNA sequence from a tumor-associated gene. This is *antisense* RNA. The antisense RNA binds to the mRNA sequence and makes an A-form antiparallel double helix and prevents it from being translated. One attractive target is the multidrug resistance (MDR) gene which codes for a protein which pumps anticancer drugs out of the tumor cell. This protein is found in many of the worst malignancies.

The other method for getting antisense RNA into the cell is to introduce DNA that will be transcribed into the antisense mRNA. Below is a fragment of the MDR gene chosen for targeting. Note that this is the DNA coding strand:

5'-AGCGCTCACC-3'

a. (5) Write out the sequence of the antisense RNA strand that would be complimentary to this. (remember to label 5' and 3' ends).

b. (5) If you were going to use the second method to introduce antisense RNA you would need a DNA template strand. Write out the sequence of the DNA template strand for the antisense RNA strand.

c. (15) Draw the **complete chemical structure** of a part of the MDR gene, pAGC.

2. Draw the structure of choline sphingomyelin with oleic acid (10)

3. Draw the structure of a mixed triacylglycerol with oleic acid, palmitoleic acid, and myristic acid. (5)

4. Which would have a higher melting point, the triacylglycerol in # 3, or tristearin (a three stearic acid triacylglycerol)? Explain why.(5)

5. Describe at least two functions for cholesterol or cholesterol derivatives in the body. (5)

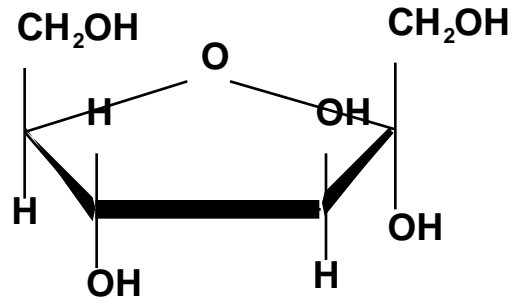
6. Describe what a membrane phase transition is and how it is measured. Name two things that can change the phase transition temperature or shape. (5)

7. Myristoylation of membrane proteins keeps them anchored to the membrane but allows them to diffuse more quickly to their targets. Rhodopsin (a membrane protein from the eye) has a diffusion coefficient of $3.0 \times 10^{-9} \text{ cm}^2/\text{sec}$ while the myristoylated G-protein subunit has a diffusion coefficient of $2.0 \times 10^{-8} \text{ cm}^2/\text{sec}$. How far (in cm) can each of these travel in 10 seconds? Show

work. RECALL: $r = (4Dt)^{\frac{1}{2}}$ where r is the distance in cm, D is diffusion coeff. and t is time(10)

8. Draw a three sugar "piece" of starch amylose, which is an α 1-4 linked polymer of glucose. (10)

9.(10)



a. What is the name of this sugar?:

b. Is it a **pyranose** or **furanose** ?(circle answer)

c. Circle the **anomeric** carbon in this structure

d. Is it in the or configuration?(circle answer)

10. (15) Classify the following structures on the next page using the following categories (they may be used more than once):

sphingolipid
cerebroside
phosphatidylcholine
phosphatidylglycerol
ceramide
aldopentose
aldohexose
aldotriose
ketoheptose
nucleotide

sterol
monoterpene
diterpene
purine
pyrimidine
wax
fat
fatty acid
phosphatidylinositol
deoxyribose
nucleoside

1

2.

3

4

5