DEPARTMENT OF MEDICINAL CHEMISTRY
SCHOOL OF PHARMACY

BASIC PHARMACEUTICAL SCIENCE FOR THE PRACTICING PHARMACIST
MEDC 527, Fall 2008

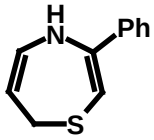
Quiz #3, Dr. Desai, 100 points; October 16, 2008

KEY

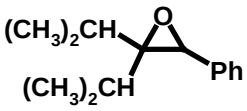
NAME (In CAPITAL Letters ONLY) **HONOR PLEDGE**

Ring Size	*Saturated*	*Partly Saturated*	*Unsaturated*
3	-irane		-irene
4	-etane		-ete
5	-olane	(dihydro)	-ole
6	-inane	(di or tetrahydro)	-ine
7	-epane	(di or tetrahydro)	-epine
8	-ocane	(di, tetra, or hexahydro)	-ocine

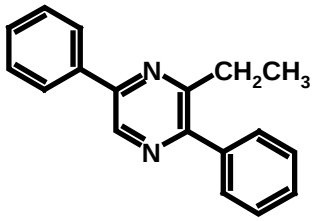
1. Write the systematic name for the following heterocycles. (12 pts)



3-phenyl-4,7-dihydro-[1,4]-thiazepine OR 3-phenyl-4H,7H-[1,4]-thiazepine



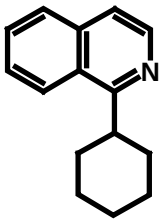
2,2-diisopropyl-3-phenyl-oxirane



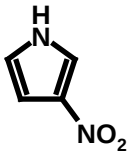
3-ethyl-2,5-diphenyl-[1,4]-diazine OR 2-ethyl-3,5-diphenyl-1,4]-diazine BUT NOT 2,5-diphenyl-6-ethyl-[1,4]-diazine

2. Draw the structure of the following heterocycles based on common names. (6 pts)

a) 1-cyclohexyl-isoquinoline

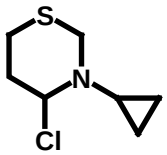


b) 3-nitro-pyrrole

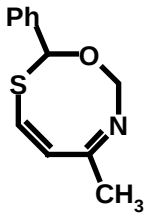


2. Draw the structure of the following heterocycles based on systematic names. (12 pts)

c) 4-chloro-3-cyclopropyl-[1,3]-thiazinane

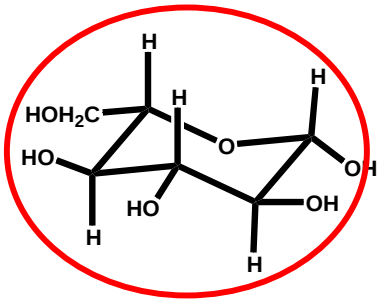


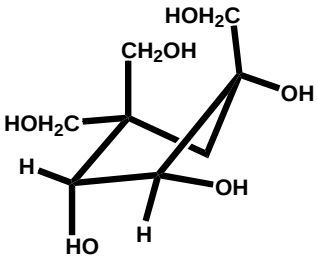
d) 6-methyl-2-phenyl-2H,8H-[1,3,7]-oxathiazocine

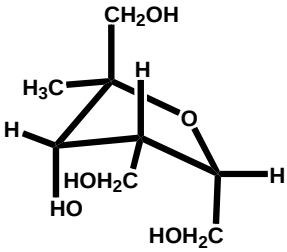


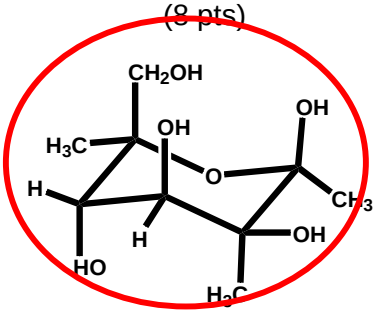
e) 2,3-dihydro-oxole

3. Circle that structures that possess hemi-acetal or acetal group(s). **<u>NOTE:</u> Negative points for identifying wrong structures**. (8 pts)

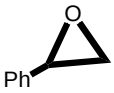




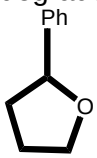




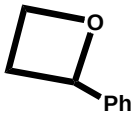
4. The stability of the following molecules is being studied at pH > 8.0. Identify the order of degradability. Use 1 for most easily degraded and 3 for least. (6 pts)



1



3



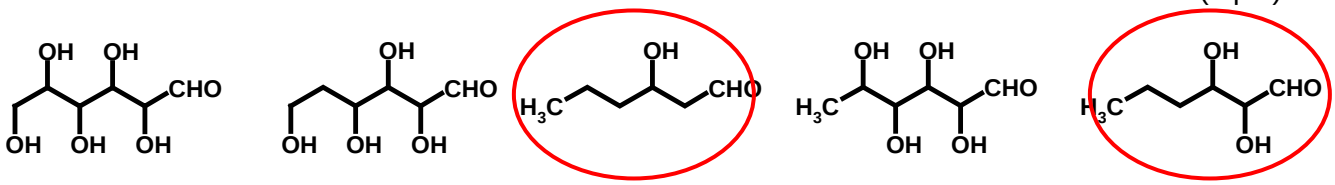
2

5. Define the following two terms in one sentence. (8 pts)

A protein _**<u>is a polypeptide; is a sequence of amino acids joined together by peptide bonds; etc.</u>**

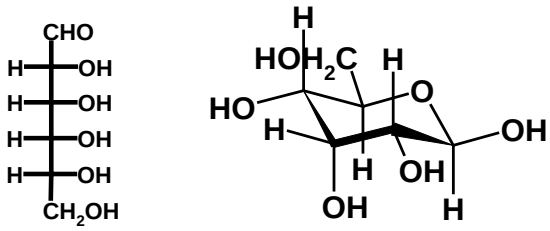
An enzyme **<u>is a protein with catalytic function</u>**

6. The following molecules are being studied in water at pH 7.0. Which molecules can be studied without any interference from the possibility of hydrolysis or hemi-acetal / acetal formation? Circle your answers. **NOTE: Negative points for identifying wrong structures**. (6 pts)

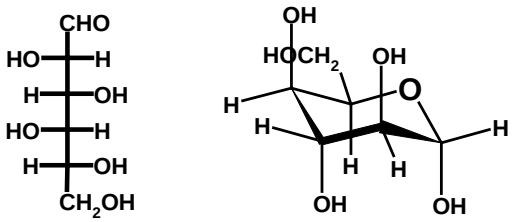


7. The open-chain and cyclic forms of monosaccharide M1 are as shown below. Draw the **alpha-form** of monosaccharide M2 and **beta-form** of monosaccharide M3 from the open-chain forms shown below. Use the cyclic structure and write the appropriate substituents. (10 pts)

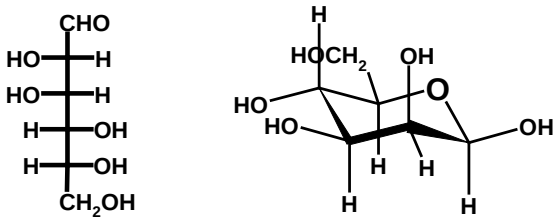
Monosaccharide M1



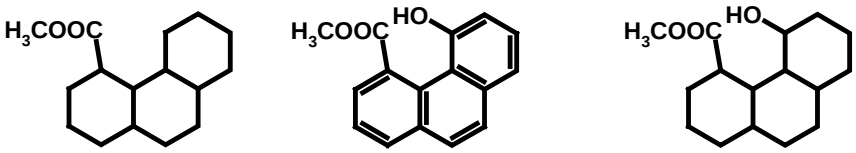
Monosaccharide M2



Monosaccharide M3



8. Following molecules undergo hydrolysis at pH 12. Identify the order of ease of hydrolysis. Use 1 for fastest hydrolysis and 3 for slowest. (9 pts)



3 **1** **2**

9. Most enzymes utilize a group of amino acid residues to perform their function. For serine proteases, these include His, Ser and Asp. Draw the charge relay mechanism of how these three residues successfully hydrolyze a substrate such as R-COOR'. (5 pts)

10. What is activation energy? Explain in fewer than 3 sentences (4 pts).

The collisional energy necessary for reactants to achieve so as to form products is activation energy.

The difference in energy between the transition state and ground state of reactants is activation energy

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The energy necessary for the reactants to reach the transition state so as to form products.

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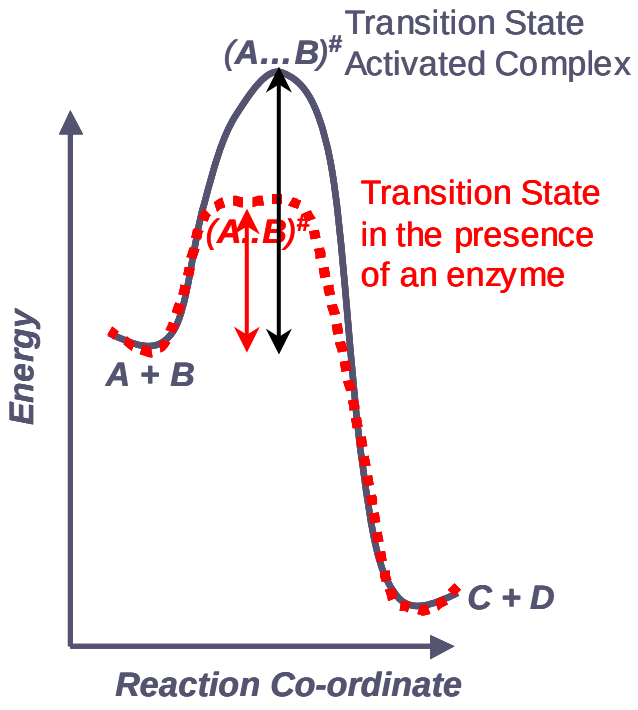
11. Draw a graph of energy *versus* reaction co-ordinate for a typical reaction. Label appropriately (4 pts). Identify activation energy in this graph (2 pts). On the same graph, draw the energy versus reaction co-ordinate profile for the reaction in the presence of an enzyme (2 pts). Identify activation energy in the presence of the enzyme (2 pts). What effect does this new activation energy have on the rate of the reaction (2 pts)? What is the typical order of change in the rate of reaction in the presence of an enzyme (2 pts)?



Activation energy should be shown using arrows/lines parallel to the Energy axis. (2 points for each arrow and identification)
A decrease in activation energy (Ea) due to the presence of the enzyme increases the rate of reaction. (2 points)
Enzymes typically increase the rate of reaction from 10^2 to 10^{17} –fold. (2 points)