

**DEPARTMENT OF MEDICINAL CHEMISTRY
SCHOOL OF PHARMACY**

Medicinal Chemistry I
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FINAL EXAM

MEDC 501
October 18, 2007

STUDENT NAME

HONOR PLEDGE

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

	IV	V	VI	VII
2	C	N	O	F
3	Si	P	S	Cl
4	Ge	As	Se	Br
5	Sn	Sb	Te	I

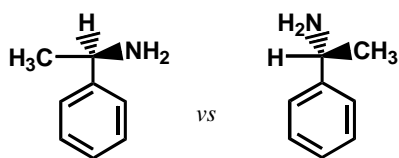
1. Draw structure of an epoxide, a beta-lactam, and a four-carbon reducing sugar in the open-chain form. Place charges, if present, on appropriate atoms. (9 pts)

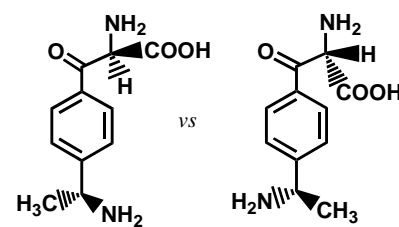
_____ an epoxide

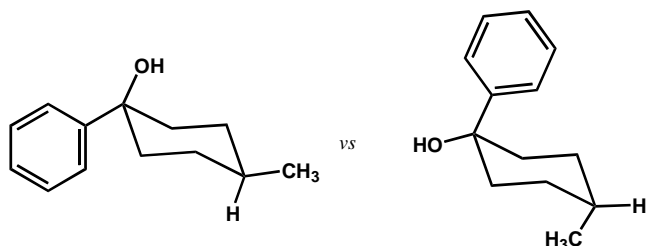
_____ a beta-lactam

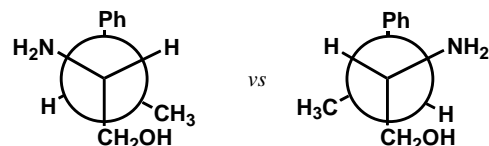
_____ a four-carbon reducing sugar (open-chain form)

2. Which of the following terms best describes each pair of compounds shown below: (20 pts)
- Conformational isomer
 - Enantiomers
 - Diastereomers
 - Meso compound
 - Same molecule
 - All of the above
 - None of the above



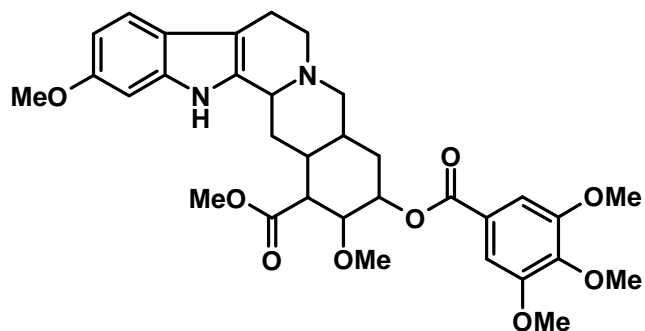




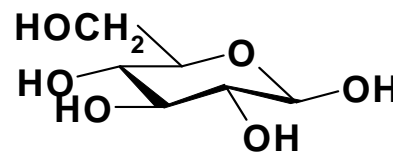


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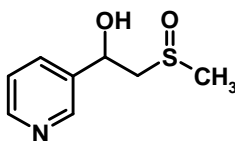
3. Circle chiral centers in the following molecules. If there are no chiral centers in a molecule, write **NONE**. **Note: Each chiral center should contain only one atom. Negative points for identifying centers that are not chiral centers.**



Reserpine
(antihypertensive)

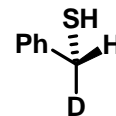
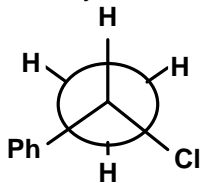


β -D-Glucose

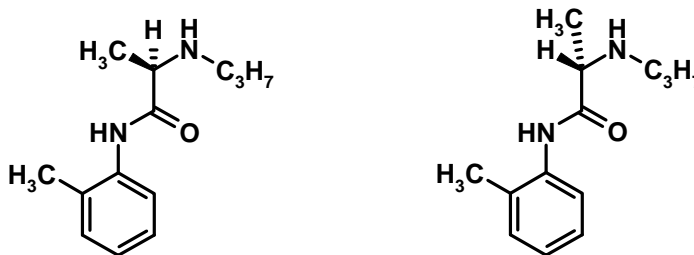


Oxisuranol
(metabolite of oxisuran
a immunosuppresant)

4. Identify the chirality of all the chiral centers in the following molecules. Use 'R' or 'S' nomenclature. (8 pts)



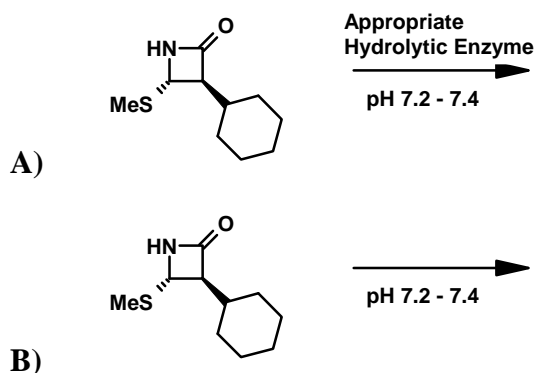
5. The isomer on the left is more extensively hydrolyzed in our body than the isomer on the right. Why? (4 pts)



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6. Draw a chair conformer of a six-membered reducing monosaccharide with the following distribution of groups: –OH groups at 1 and 3 are axially oriented, while those at 2 and 4 are equatorial. The –CH₂OH group at 5 position is equatorial (4 pts). Draw its conformational isomer that might exist in equilibrium (4 pts). Circle the isomer that more stable of the two. (1 pts)

7. Consider reactions A) and B). Circle the reaction that has a shorter half-life? (4 pts)

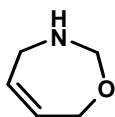
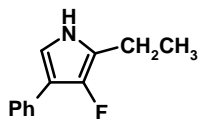
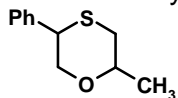


8. Draw the structure of following natural α -amino acids at pH 12. Use bold and cross-hatched lines to show 'S' stereochemistry. Indicate appropriate charges (12 pts)

Histidine

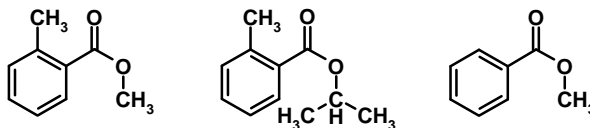
Tyrosine

9. Write the systematic name of the following heterocycles. (12 pts)

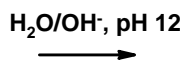
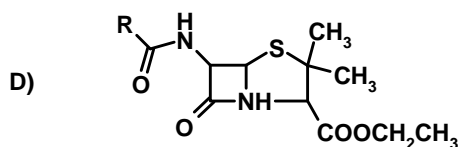
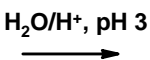
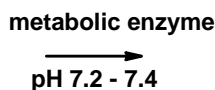
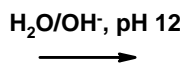
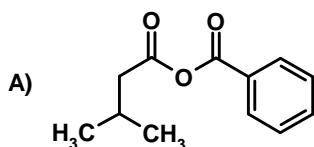


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10. Rank the following compounds on their ability to undergo hydrolysis at pH 1 (H^+/H_2O). Use 1 for most easily hydrolyzable and 3 for least. **NOTE: Entire sequence has to be correct to get any points.** (6 pts)



11. Draw product(s) of the following hydrolytic reactions assuming that complete hydrolysis is occurring. Write appropriate charges on functional groups formed in the reaction. If there is no product, write NONE. (22pts)



12. Define the following terms: (12 pts)

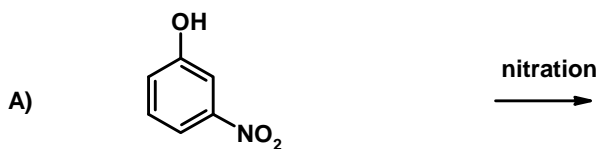
1) Meso Compounds _____

2) Diastereomers _____

3) Enantiomers _____

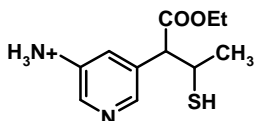
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13. Predict the product(s) of the following reactions. If there is no product, write NONE. (15 pts)

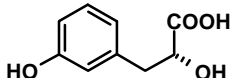


14. Indicate whether the following compounds will exhibit good water solubility at pH 7.2 – 7.4. Circle the correct answer. (12 pts)

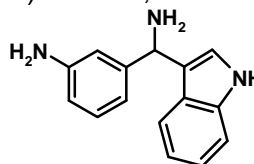
A) Soluble, Insoluble



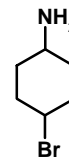
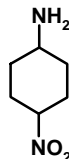
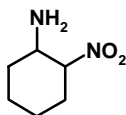
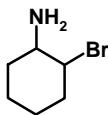
B) Soluble, Insoluble



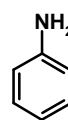
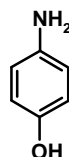
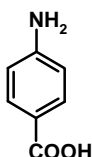
C) Soluble, Insoluble



15. Rank the following molecules according to the **basicity of $-NH_2$ group**. Use 1 for most basic and 4 for least basic. (12 pts)

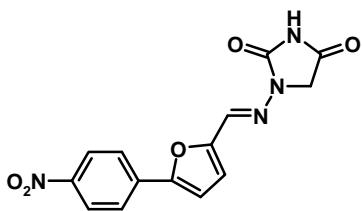


16. Rank the following molecules according to the **acidity of the molecule**. Use 1 for most acidic and 3 for least acidic. (9 pts)

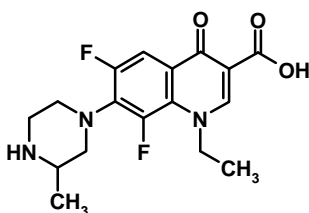


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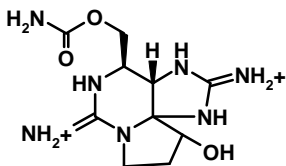
17. Circle ionizable functional group(s) (pH range 0 -14) in the following molecules and indicate their approximate pK_A value or range. **NOTE: If there are no ionizable groups on the molecule, write NONE. Also, -1 point for identifying a functional group that does not ionize in the pH range 0–14.**



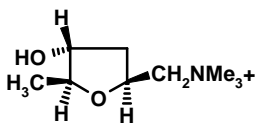
Dantrolene
(Muscle Relaxant)



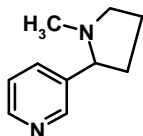
Lomefloxacin
(antibacterial)



Saxitoxin
(a toxic anesthetic)



Muscarine



Nicotine