DEPARTMENT OF MEDICINAL CHEMISTRY
SCHOOL OF PHARMACY

Medicinal Chemistry I | **FINAL EXAM** | MEDC 501
Dr. Umesh R. Desai | | October 20, 2006

STUDENT NAME **HONOR PLEDGE**

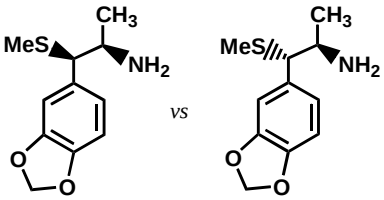
Ring Size	*Saturated*	*Partly Saturated*	*Unsaturated*
*Rings with **N***			
3	-iridine		-irine
4	-etidine		-ete
5	-olidine	-oline	-ole
6	(hexahydro)	(di or tetrahydro)	-ine
7	(hexahydro)	(di or tetrahydro)	-epine
8	(octahydro)	(di, tetra, or hexahydro)	-ocine
*Rings without **N***			
3	-irane		-irene
4	-etane		-ete
5	-olane	-olene	-ole
6	-ane	(di or tetrahydro)	-ine
7	-epane	(di or tetrahydro)	-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 isoquinoline, thiophene and tetrahydrofuran. Place charges, if present, on appropriate atoms. (9 pts)

_____ _____ _____
Isoquinoline thiophene tetrahydrofuran

2. Which of the following terms best describes each pair of compounds shown below: (20 pts)
   a. Conformational isomer
   b. Enantiomers
   c. Diastereomers
   d. Meso compound
   e. Racemic compound
   f. None of the above



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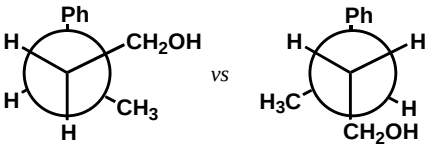

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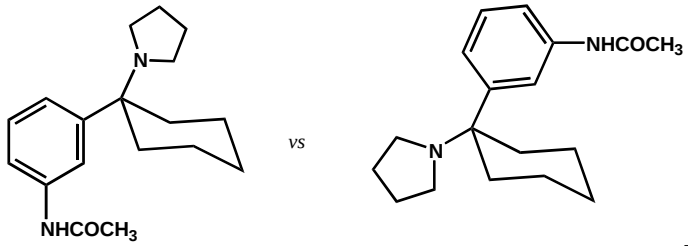

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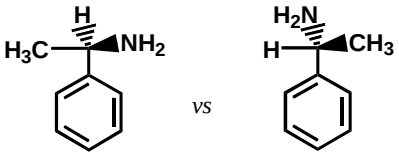

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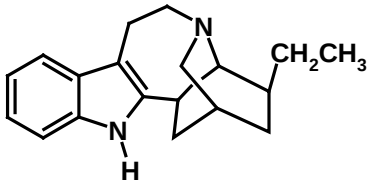
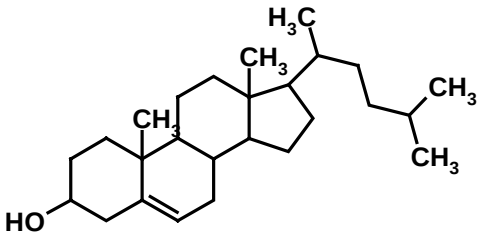
3. Identify chiral centers (mark with an asterisk "*****") in the following molecules. If there are no chiral centers in a molecule, write **NONE**. (6 pts)

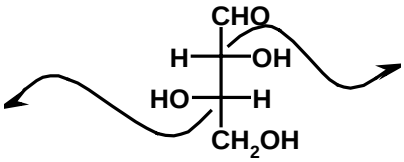


Ibogaine

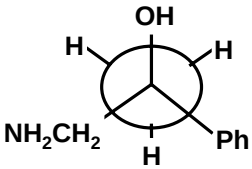


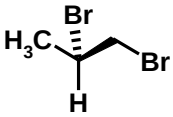
Sitosterol

4. Following is a Fischer projection for a precursor to glucose. Identify the configuration (R and/or S) of the stereo-centers present in this precursor. For convenience, arrows are provided. (4 pts)



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

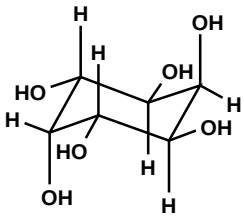


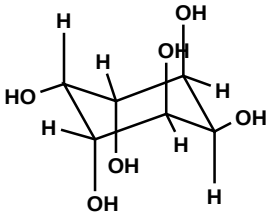


6. Draw 'Z' isomer of diethylstilbestrol ($R_1R_2C{=}CR_1R_2$, where R_1= *p*-HO-C_6H_4- and R_2 = -CH_2CH_3) (4 points). Which isomer of diethylstilbestrol is expected to be more stable at room temperature? (2 pts)

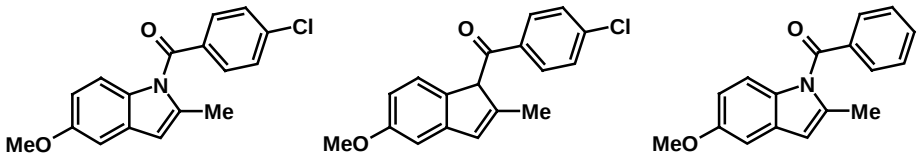
The isomer of diethylstilbestrol that is expected to be more stable at room temperature is _____.

7. Two conformers of a pseudo-sugar are shown. Circle the conformer that is more stable of the two. (4 pts)



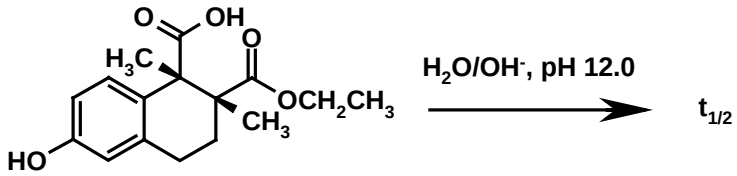


8. Rank the following compounds on their ability to undergo hydrolysis at pH 12 (H_2O/OH^-). Use 1 for most easily hydrolyzable and 3 for least. (9 pts)

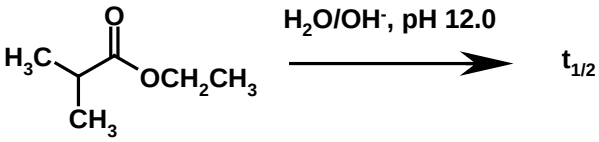


9. Consider reactions A) and B). Circle the reaction that has a longer half-life? (4 pts)

A)



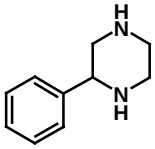
B)



10. Draw the structure of following natural α–amino acids at pH 7.2 in their stereochemically correct form ('S' stereochemistry according to Cahn-Ingold-Prelog convention). Use bold and cross-hatched lines to show 'S' stereochemistry. Indicate appropriate charges (8 pts)

_____ _____
Arginine Cysteine

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



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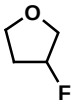

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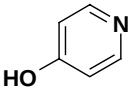

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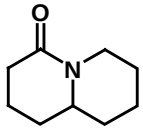
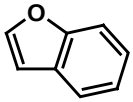
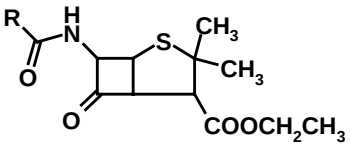
12. Draw product(s) of the following reactions. Write appropriate charges on functional groups formed in the reaction. If there is no product, write NONE. (22 pts)

A) 

H_2O/OH^-, pH 12 →

B) 

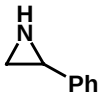
H_2O/H^+, pH 3 →

C) 

H_2O/OH^-, pH 12 →

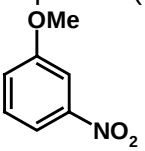
D) 

metabolic enzyme →

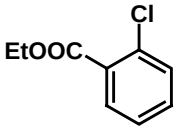
E) 

H_2O/H^+, pH 3 →

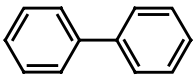
13. Predict the product(s) of the following reactions. If there is no product, write NONE. (12 pts)

A) 

chlorination →

B) 

nitration →

C) 

sulfation →

14. Complete the following sentences: (8 pts)

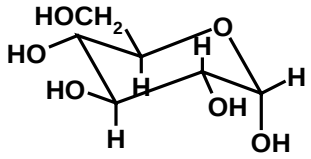
1) Glycated hemoglobin is formed by the reaction of _____form of sugar with _____ residue of hemoglobin.

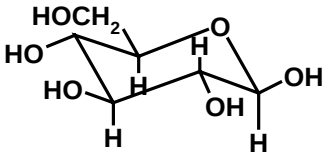
2) ATP is a high energy molecule because _____

_____

_____.

15. Underneath each structure below, write whether it is α (alpha) or β (beta) sugar. (6 pts)

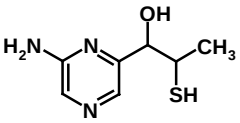




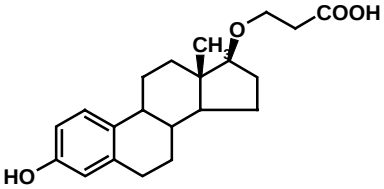
_____ _____

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

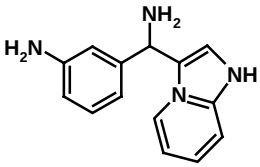
A) Soluble, Insoluble



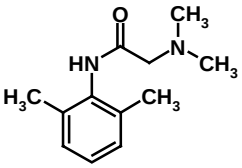
B) Soluble, Insoluble



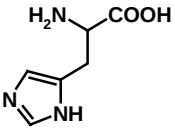
C) Soluble, Insoluble



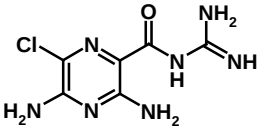
17. Circle ionizable functional group(s) (pH range 0 -14) in the following molecules and indicate their approximate pK_A value or range. If there are no ionizable groups, write NONE. **<u>NOTE: -1 point for identifying an ionizable functional group, which does not ionize in the pH range 0–14.</u>** (14 pts)



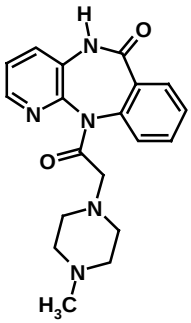
Lidocaine



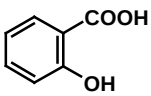
histidine



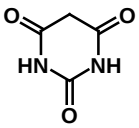
Amiloride



Pirenzepine

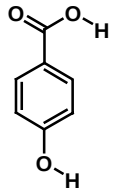
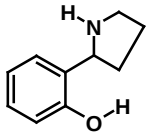
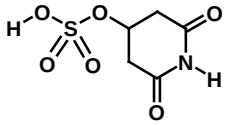
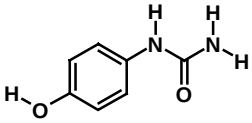


Salicylic acid

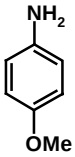
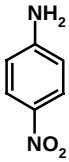
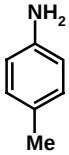
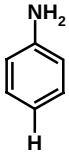


Barbiturate

18. Circle the most acidic proton in the each of the following structures. (12 pts)

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

20. Rank the following molecules according to their mp/bp. Use 1 for highest mp/bp and 3 for lowest. (12 pts)