

**DEPARTMENT OF MEDICINAL CHEMISTRY
SCHOOL OF PHARMACY
1 HR EXAM**

Medicinal Chemistry I
Dr. Umesh R. Desai

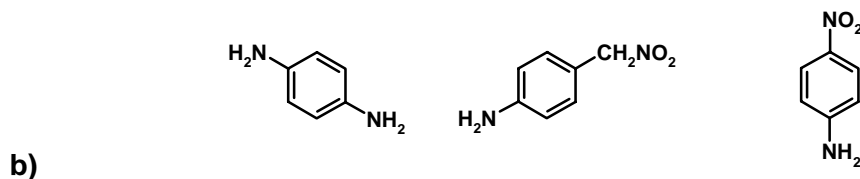
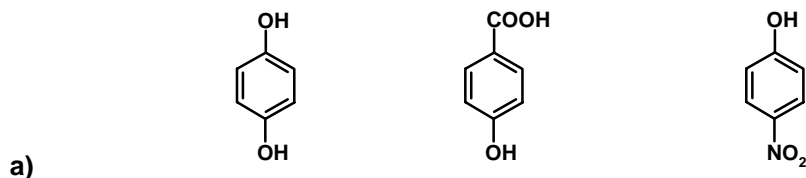
MEDC 501
September 20, 2007

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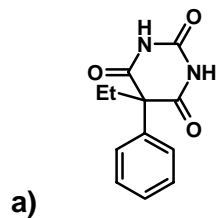
	IV	V	VI	VII
2	C	N	O	F
3	Si	P	S	Cl
4	Ge	As	Se	Br
5	Sn	Sb	Te	I

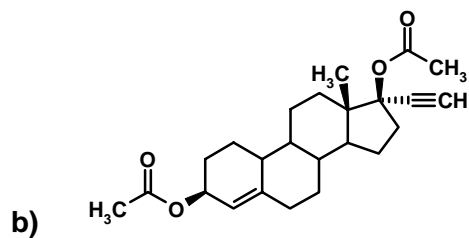
Instructions: Answer all questions. Points are listed on the right hand side.

1. Rank the following molecules/ions in each series according to their acidity. If more than one pK_A value exists for a molecule/ion, use the lower pK_A value. Use 1 for most acidic, 2 for next most acidic and so on.



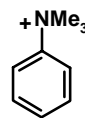
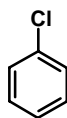
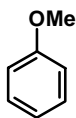
2. The following drugs undergo complete hydrolysis at pH 7.2–7.4. Draw the structure of product(s) formed in appropriate ionic form(s).



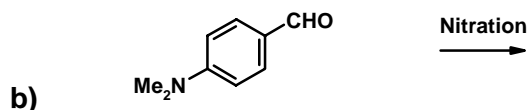
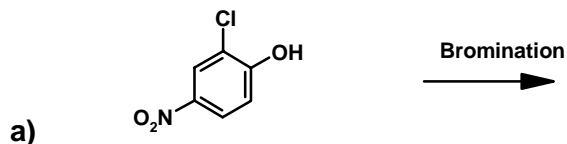


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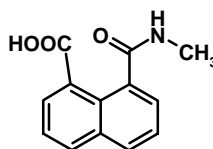
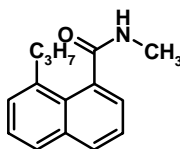
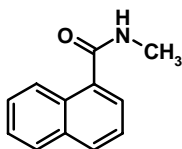
3. Rank the following molecules according to their ability to undergo nitration with $\text{HNO}_3/\text{H}_2\text{SO}_4$.



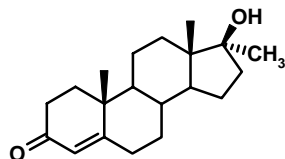
4. Write the structure of the pre-dominant product(s) obtained in the following electrophilic aromatic substitution reactions.



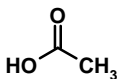
5. Rank the following molecules according to their ability to hydrolyze faster in water at pH 6.0. Use 1 for fastest hydrolysis, 2 for next fastest and so on.



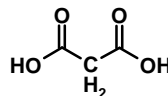
6. 17α -methyltestosterone (structure below) is an androgenic agent. A scientist wants to make it more water soluble to prepare for an intravenous injection. Of the three acids available to you – acetic acid, succinic acid and citric acid (structure below) for converting the drug into its ester form, which would be most preferable to rapidly solubilize 17α -methyltestosterone? Circle the answer. What should be the pH of the solution?



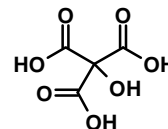
17 α -methyltestosterone



acetic acid



succinic acid



citric acid

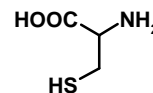
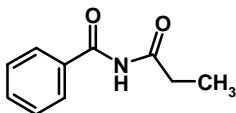
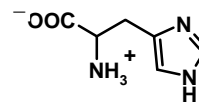
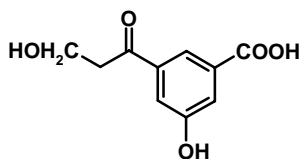
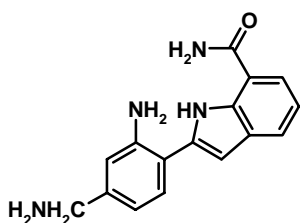
The pH of the solution should be _____.

7. According to the Arrhenius equation, the factors that determine the rate of a chemical reaction include _____, _____, _____, and _____.

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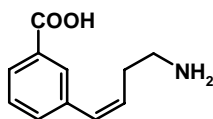
8. The reason why carboxylic acid amides are more stable to basic hydrolysis than carboxylic acid esters is _____

9. Circle ionizable functional group(s) in the following compounds and write the expected pK_A value by its side. If the compound does not have an ionizable functional group (pK_A between 0 and 14), write either neutral or N/A. **Note: -1 point for every wrong answer.**

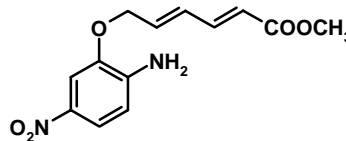


10. Indicate whether the following compounds would be soluble or insoluble (circle the appropriate word) at pH 7.0.

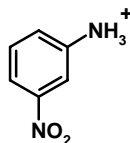
A) Soluble, Insoluble



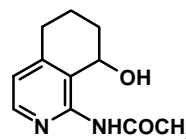
B) Soluble, Insoluble



C) Soluble, Insoluble

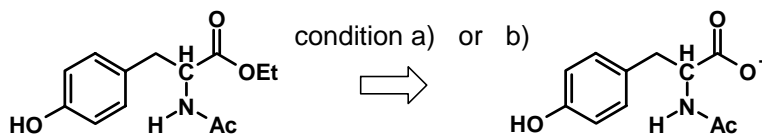


D) Soluble, Insoluble



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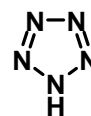
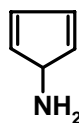
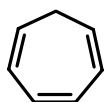
11. Which of the following hydrolytic reactions will be faster? Circle either a) or b).



a) pH 12, OH⁻/H₂O

b) Chymotrypsin, pH 7.2

12. Circle the molecules from below that are aromatic? **Please note: -2 point for every wrong molecule identified.**



13. Draw the structures of the products **A** through **F** in the following hydrolytic reactions. Draw each product in its appropriate ionized form. **Please note: Formation of a small molecule, e.g., CO₂, NH₃, CH₃COOH, etc. is not to be considered as a product.**

