

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

Second Semester 2021-2022

End-Semester Examination (OPEN BOOK)

Course Name: Pharmaceutical Chemistry

Course No: PHA F241

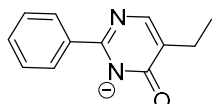
Total Marks: 25

Date: 10-05-2022

Duration: 120 (max)

Instructions: a) All questions are compulsory; b) Maximum marks are mentioned in the square brackets; c) Handwriting should be legible; d) Give the answers for all sub-parts together in one place; e) Answers must be based on the reagents/reactions discussed in the lectures. f) Do all the rough work on the last sheet

1) Draw all the resonance forms of the following negatively charged molecule. Explain which resonance structure will contribute maximum to the final structure. [4]



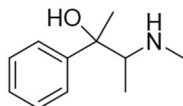
2) Compound **A** (molecular formula C₅H₁₂) is monobrominated using a free radical reaction leading to the formation of only compound **B**. When compound **B** is treated with a strong base, a mixture is obtained containing compounds **C** and **D**. Using this information, answer the following questions: [3+2+2 = 7]

(a) Draw the structures of compounds **A**, **B**, **C**, and **D** and provide an explanation.

(b) When compound **B** is treated with *t*-BuOK which product predominates: **C** or **D**? Explain your choice.

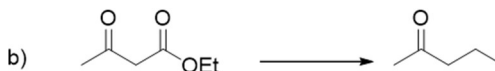
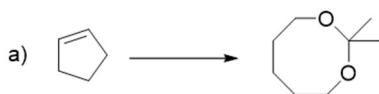
(c) When compound **B** is treated with NaOEt, which product predominates: **C** or **D**? Explain your choice.

3) Amines act as nucleophiles and attack the less hindered position of the substituted epoxides, leading to a ring-opening reaction. Using this type of reaction, show how you might prepare the following compound from benzene, ammonia, and any other reagents of your choice. [6]



4) Compound **A** is an amine that does not possess a chiral center. Compound **A** was treated with excess methyl iodide and then heated in the presence of aqueous silver oxide to produce an alkene. The alkene was further subjected to ozonolysis to produce butanal and pentanal. Draw the structure of compound **A** and explain your answer. [3]

5) Provide the efficient synthesis of following transformations. [2+3 = 5]



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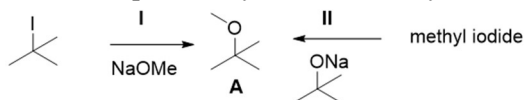
Total Marks: 20 (scaled down to 10)

Date: 10-05-2022

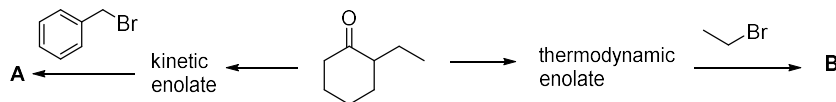
Duration: 90 (max)

Instructions: a) All questions are compulsory; b) Maximum marks are mentioned in the square brackets; c) Handwriting should be legible; d) Give the answers for all sub-parts together in one place; e) Answers must be based on the reagents/reactions discussed in the lectures. f) Do all the rough work on the last sheet

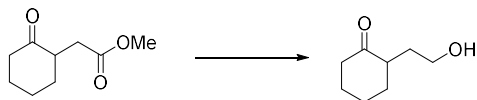
1) Theoretically, ether **A** can be synthesized by substitution reaction in two ways (**I** and **II**). Which of these methods is practically useful and why? [2]



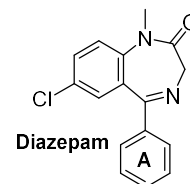
2) a) Draw the structures of 'kinetic' and 'thermodynamic' enolates in the following scheme, b) provide the conditions for their formation, c) Which of these enolates is formed 'faster' and which one is more 'stable'. Give reasons for your answer, d) Provide the structures of major products **A** and **B**. [2+2+2+2 = 8]



3) a chemist wants to reduce the ester group chemoselectively in the presence of a ketone. Explain the synthetic scheme with reagents that he/she should follow and justify it. [3]



4) Diazepam is used to treat anxiety disorders, (a) using resonance structures, predict whether the aromatic ring **A** in diazepam is activated or deactivated toward electrophilic aromatic substitution, b) predict the strength of the activation/deactivation (strong, moderate, or weak), c) Finally, predict the directing effects for that ring. [2]



5) Predict the major product(s) in the following reactions. Only draw the final structure as the answer. Drawing any other structure/intermediate will lead to the deduction of marks. [5]

