



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF APPLIED CHEMISTRY

INDUSTRIAL ORGANIC CHEMISTRY III

SCH 4215

Second Semester Examination Paper

May 2015

This examination paper consists of 5 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements:

Examiner's Name: Dr C T Parekh

INSTRUCTIONS

1. ANSWER **ALL** QUESTIONS FROM SECTION A AND **ANY THREE** QUESTIONS IN SECTION B. SECTION A CARRIES 40 MARKS AND EACH QUESTION IN SECTION B CARRIES 20 MARKS.
2. START EACH QUESTION ON A NEW PAGE. (NOT EACH PART OR SUB SECTION OF THE QUESTION)
3. SHOW MECHANISM, CHEMICAL STEPS OR SYNTHESIS BY MEANS OF CURVED ARROWS.

MARK ALLOCATION

QUESTION	MARKS
1.	40
2.	20
3.	20
4.	20
5.	20
TOTAL POSSIBLE MARKS	100

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SECTION A

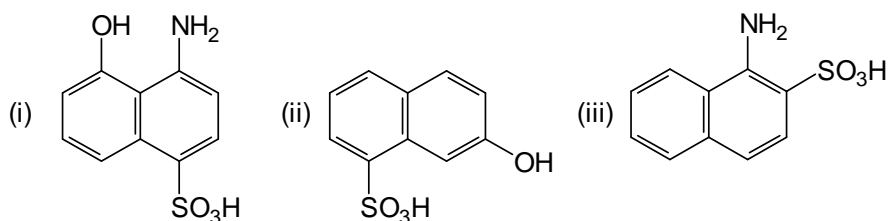
1. (a) Define dyes in your own words. (3 Marks)
- (b) Give chemical structures for the following polymers. (4 Marks)
- (i) PET
 - (ii) Nylon 6,6
- (c) Digoxin is a heartbeat regulator extracted from foxglove. Draw the structure of digoxin. (3 Marks)
- (c) Give the therapeutic class of each of the following drugs: (do not repeat the class) (6 Marks)
- (i) valium
 - (ii) amoxil
 - (iii) renitidine
 - (iv) phenobarbital
 - (iv) aspirin
 - (v) prozac
- (e) What are vitamins? (4 Marks)
- (f) What do you understand by the term bioavailability? (3 Marks)
- (g) What do you understand by "*first pass effect*"? (4 Marks)
- (h) Why is β -naphthol and not 2-naphthyl amine used to manufacture Amino dyes? (3 Marks)
- (i) Give three ways of administering a drug to a patient. (3 Marks)
- (j) Write reaction mechanism (use curved arrows) of a diazo coupling reaction between phenol and aniline (phenyl amine). Indicate reagents and reaction conditions. (5 Marks)
- (i) What is the difference between dyes and pigments? (2 Marks)

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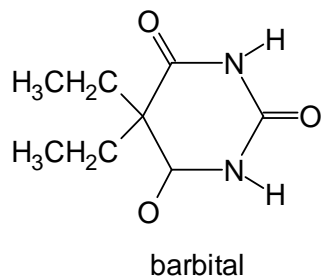
SECTION B

2. (a) Describe the manufacture of citric acid by fermentation and suggest three main uses of it. (10 Marks)
- (b) Outline the synthesis of aspirin which is an analgesic from phenol. Use reagents of your choice. (5 Marks)
- (c) Explain what the letter A, E, M, D and Z stand for in dye industry. (5 Marks)
3. (a) There are two alkaloids namely vincristine and vinblastine among other alkaloids extracted from a plant which are used in the treatment of cancer.
- (i) Give the botanical name and the common name of the plant.
- (ii) Draw the chemical structure of any one of the alkaloids. (2+4 Marks)
- (b) Suggest the synthesis of anthraquinone from phthalic anhydride. Use reagents of your choice. (5 Marks)
- (c) Hormones are secreted by ductless glands called endocrine glands. Give the name of one of the ductless glands, name the hormones it secretes and the hormone's function in the body. (4 Marks)
- (d) State condition(s) and indicate the position by an arrow where the following intermediates couple during dye manufacturing. Also indicate wherever possible where the first coupling will take place.



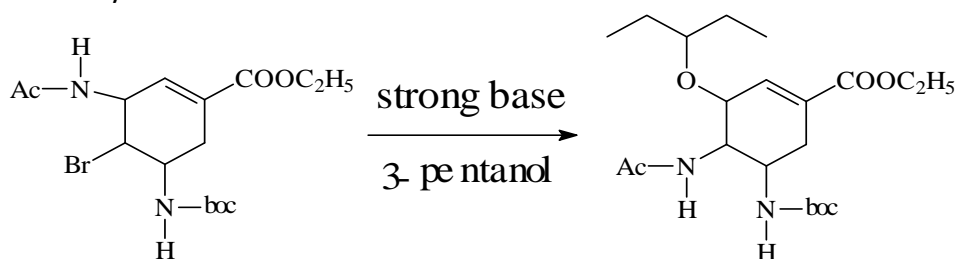
(5 Marks)

4. (a) Outline the synthesis of barbital, from diethylmalonate $[\text{CH}_2(\text{COOC}_2\text{H}_5)_2]$. Use reagents such as sodium ethoxide, chloroethane, urea etc. (No mechanism required).



(8 Marks)

- (b) Oseltamivir phosphate known as Tamiflu which is prescribed for swine flu. The reaction below is a three steps reaction, part of the synthesis of Tamiflu by Corey et al.

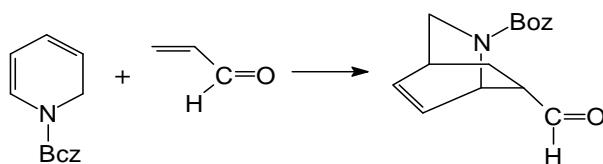


Write reaction mechanism for the each step. Use curved arrows.

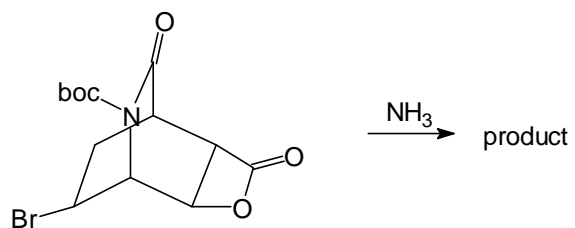
(6 Marks)

- (c) Tamiflu is also synthesised by a process developed by Fukuyama. This involves multiple steps. Two of the steps are given below: (Use curved arrows).

(i)



(ii)



Write reaction mechanism for the above steps. Suggest the name of the reaction.

Use curved arrows.

(6 Marks)

5. (a) Draw the labelled schematic diagram for the manufacture of high density polythene (HDPE).

(10 Marks)

- (b) You are given 1-amino-8-naphthol-4-sulphonic acid (S-acid), 4-aminobenzene sulphonic acid (sulphanilic acid), 1-naphthyl amine, acidic solution and alkaline solution. Draw the structure of the unknown dye step by step with coupling conditions. Indicate the Winther's formula for it.

(10 Marks)

End of question Paper!!!