



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF APPLIED CHEMISTRY

INDUSTRIAL ORGANIC CHEMISTRY III
SCH 4215

FOR SCH STUDENTS ONLY

Second Semester Examination Paper

MAY 2017

This examination paper consists of 5 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: NONE

Examiner's Name: DR C T PAREKH

INSTRUCTIONS

1. Answer all questions from Section A and any three from Section B. Section A carries 40 marks and each question in Section B carries 20 marks.
2. 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) Draw the structures for the following compounds.
(i) Tartrazine
(ii) Prozac (fluoxetine) (4 Marks)
- (b) Define antibiotics? Give the name and structure of one drug which is prescribed by the GP. (4 Marks)
- (c) You are given six different drugs and their therapeutic classes are jumbled up. Rewrite the drugs with their correct therapeutic classes.

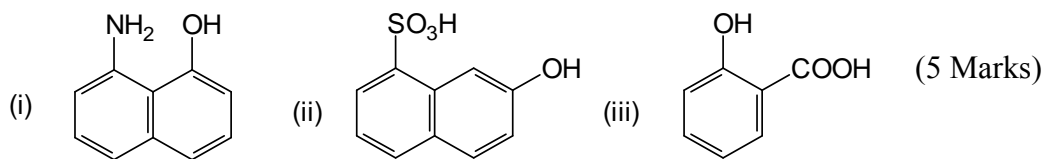
name of the drug

therapeutic class

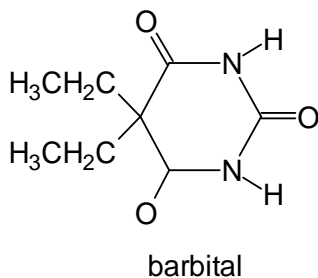
- | | |
|--------------------|---|
| (i) atenolol | (i) sedative |
| (ii) digoxin | (ii) asthma |
| (iii) taxol | (iii) cancer treatment |
| (iv) phenobarbital | (iv) type II diabetes |
| (v) metformin | (v) cardiovascular diseases; hypertension |
| (vi) salbutamol | (vi) heartbeat regulator |
- (6 Marks)
- (d) What is the difference between local anaesthetics and general anaesthetics? (4 Marks)
- (e) What do you understand by the term bioavailability? (3 Marks)
- (f) What do you understand by “*first pass effect*”? (3Marks)
- (g) Why is β -naphthol and not 2-naphthyl amine used to manufacture many azo dyes? (3 Marks)
- (h) Indicate the differences between viruses and bacteria. (6 Marks)
- (i) Write the reaction mechanism (use curved arrows) of a diazo coupling reaction between phenol and benzene diazonium salt. Indicate the reaction conditions. (5 Marks)
- (j) What is the difference between dyes and pigments? (2 Marks)

SECTION B:

2. (a) Describe the manufacture of lactic acid by fermentation and suggest three main uses of it. (10 Marks)
- (b) Draw the labelled schematic diagram for the manufacture of LDPE. (10 Marks)
3. (a) (R)-sulphoraphane is isolated from a vegetable plant. It helps in degrading carcinogenic compounds in the liver.
- (i) Give the name of the plant.
- (ii) Draw the chemical structure of the compound. (1+2 Marks)
- (b) Suggest at least two methods for the synthesis of 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 hormone it secretes and the hormone's function in the body. (4 Marks)
- (d) State the condition(s) and indicate the position by an arrow where the following intermediate couple occurs during dye manufacturing. Also indicate wherever possible where the first coupling will take place.

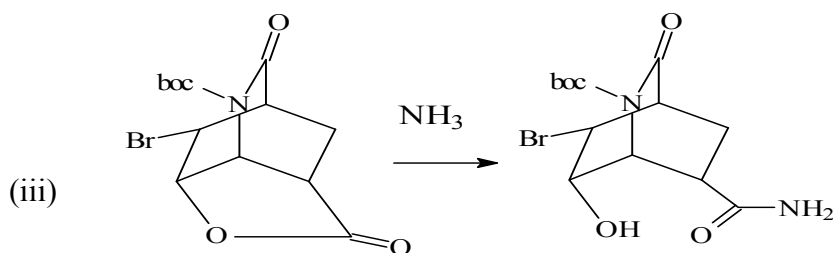
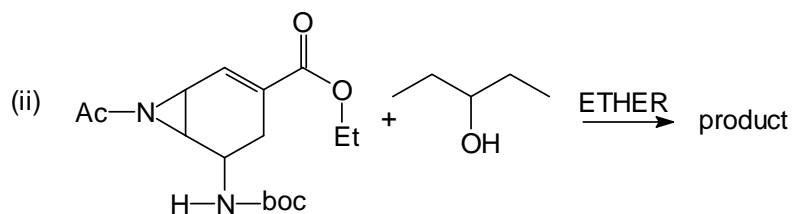
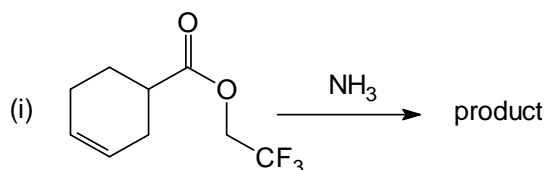


4. (a) Outline the synthesis of barbital from diethylmalonate. Use reagents such as sodium ethoxide, chloroethane, urea etc.



(8 Marks)

- (b) Swine flu is caused by a virus and there are two anti-viral drugs that are available for the treatment of swine flu. (i) oseltmivir-phosphate (Tamiflu) and (ii) zanamivir (relenza). Among these two drugs Tamiflu is widely prescribed. There are two to three pathways to synthesise this drug such as the Corey et al synthesis, Fukuyama synthesis and Sibasaki synthesis etc. They used different starting raw materials to produce Tamiflu. You are given the following steps from three different syntheses. Write the reaction mechanism for each of them. (Use curved arrows for movement of electrons).



(4+4 +4 Marks)

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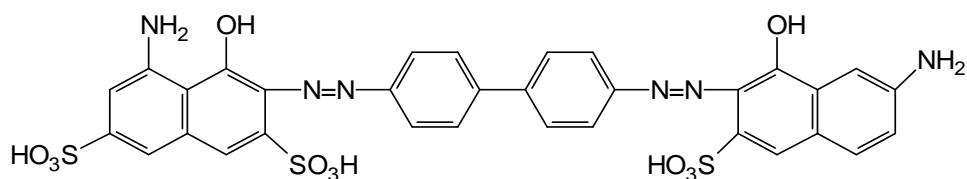
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5. (a) Paracetamol (panadol) is an analgesic and antipyretic drug which is available over the counter in pharmacies or supermarkets.

It is synthesised from phenol. Write the reaction mechanism for the synthesis of paracetamol. One of the steps involves Beckmann rearrangement. Write also the mechanism for Beckmann rearrangement. You may need acetic anhydride, hydroxyl amine and other reagents.

(10 Marks)

- (b) Write three components for the following dye. Write the reaction mechanism step by step to synthesise the dye. Indicate Winther's formula for it. (use curved arrows wherever possible).



(10 marks)

*****END OF PAPER*****