

# NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF APPLIED CHEMISTRY

END OF SECOND SEMESTER EXAMINATIONS: APRIL/MAY 1999

INDUSTRIAL ORGANIC CHEMISTRY: SCH 4215

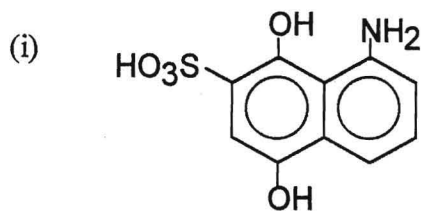
TIME: THREE HOURS

## INSTRUCTIONS TO CANDIDATES

Answer ALL questions in this Section and any THREE in Section B.

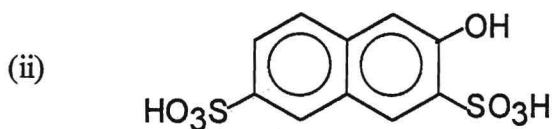
### Section A

- Starting with phenol, show the mechanism of a diazo coupling reaction at the *ortho* position. (5 marks)
- What are OTC drugs? Give TWO examples of such drugs. (4 marks)
- Name FIVE basic raw materials for plastic resins. (5 marks)
- Write the Chemical structures of any TWO of the following drugs:
  - phenobarbital
  - aspirin
  - diazepam(2 marks)
- (a) Indicate with arrows the coupling positions and specify the *pH* at each position on the following acids:



(2 marks)

**M Acid**



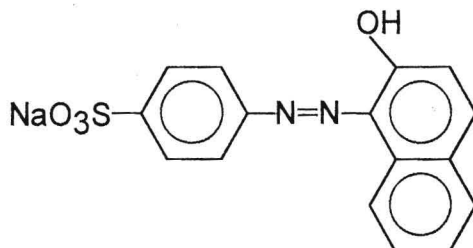
(1 mark)

**R Acid**

(b) With examples, explain the factors that influence the reactivity of the diazonium compound,  $\text{Ar-N}_2^{\oplus}$ . (2 marks)

6. Name **THREE** ways of drug classification. (3 marks)

7. (a) Synthesize *Acid Orange 7* shown below:



(b) What substituents would you introduce in a typical azo dye to increase brilliance? (3 marks)

8. Complete the following by providing at least TWO uses of the given resin.

Resin Type	Applications
Polyurethanes	
Acrylics	
Phenoplasts	
Polyesters	
Epoxies	

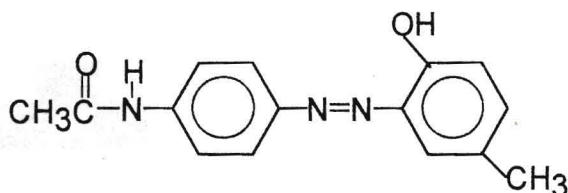
(5 marks)

9. What do the following production terms mean in their respective industries?  
Blooming, malting, sweetening, pulping and creaming.

(5 marks)

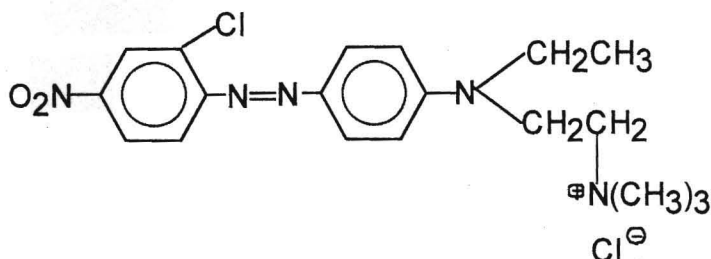
## Section B

- With the aid of a flow diagram, describe in detail the BULK polymerisation (production) of polystyrene on a commercial scale. (12 marks)
  - What are some of the main properties and applications of this polymer. (8 marks)
- Outline a synthesis for *Disperse Yellow 3* shown below:  
(The starting compound for the diazo component should be aniline while that of the coupling component should be any mono-substituted benzene).



(10 marks)

- Starting with a mono-substituted benzene, outline a synthesis of the *Coupling Component* for *Basic Red 18*.



(10 marks)

- Compare and contrast TWO of the following resin production techniques, citing advantages and disadvantages of each method:  
Bulk, solution, suspension and emulsion polymerisation. (20marks)
- Describe the manufacture of Industrial Alcohol by:
  - synthesis from ethylene (10 marks)
  - sugar/corn fermentation (10 marks)
- With the aid of a chemical flow chart, outline the commercial production of EITHER Phenobarbital OR Diazepam. (12 marks)
  - What therapeutic class does the chosen drug fall under? (1 mark)
  - Explain the merits and demerits of use and abuse of the drug. (7 marks)

**END OF QUESTION PAPER!!!**