

KABARAK



UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

**FOR THE DEGREE OF BACHELOR OF SCIENCE IN
EDUCATION SCIENCE**

COURSE CODE: CHEM 312

COURSE TITLE: ORGANIC CHEMISTRY III

STREAM: SESSION VII

DAY: SATURDAY

TIME: 2.00 – 4.00 P.M.

DATE: 28/12/2009

INSTRUCTIONS:

ATTEMPT ALL QUESTIONS

TOTAL MARKS = 70 (each 17.5 marks)

PLEASE TURN OVER

1. (a) (i) Explain why aldehydes generally are more reactive under nucleophilic addition reaction than ketones.

(ii) Arrange the following molecules according to their decrease in reaction

Order: isopentyl-tert-butyl ketone, propanone and ethanal. Explain the order.

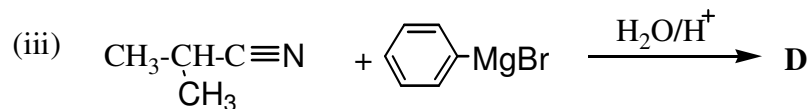
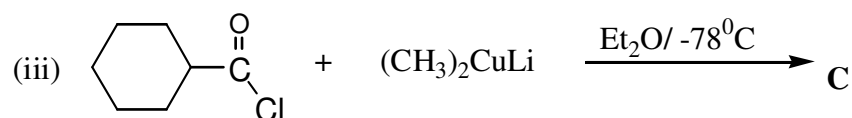
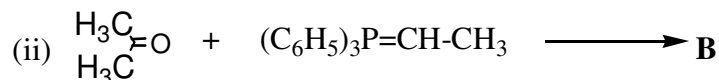
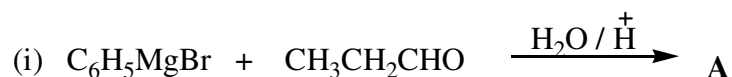
(6 mks)

(b) Describe with the use of equations the synthesis of each of the following from suitable organic reagents.

(i) *m*-bromobenzaldehyde starting from benzoic acid

(ii) *n*-propyl-phenyl ketone starting from benzene (5.5 mks)

(c) Draw the structure and provide a name for the product formed in each of the following reactions: (6 mks)



2. (a) (i) The *K_a* of ClCH_2COOH is 136×10^{-5} moles/litre and for CH_3COOH is

1.75×10^{-5} moles/litre, give the more acidic compound. Explain your answer.

(3 mks)

(ii) Explain using mechanism how α - alkylation of cyclopentanone can be done using suitable reagents.

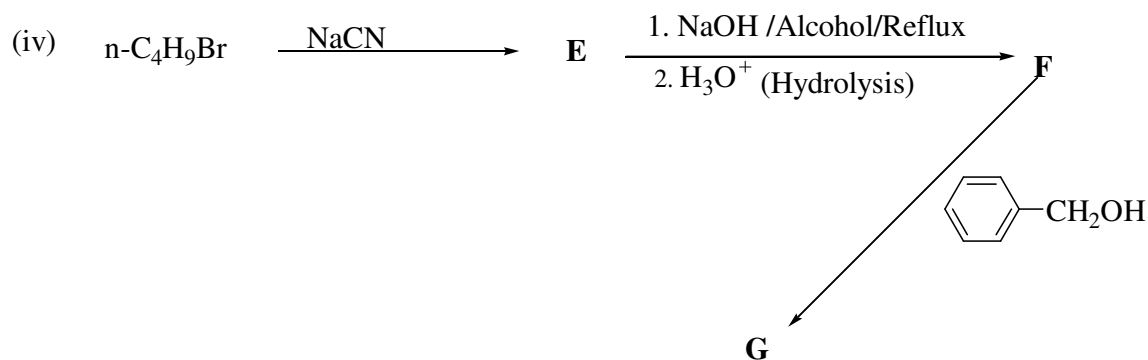
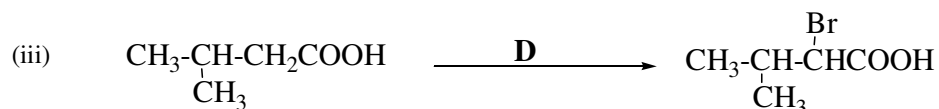
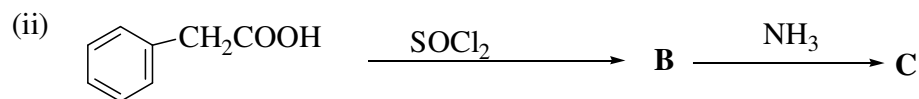
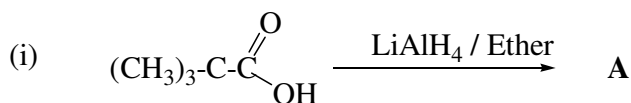
(2.5 mks)

(b) (i) Outline all steps in the synthesis of 2, 2-dimethylpropanoic acid starting from tert-butylchloride and any other reagents?

(ii) Outline the synthesis of benzoic acid starting from benzene and any other reagents.

(4 mks)

(c) Complete the following equation reaction and give the name of the missing reactants/ reagent or product. (7 mks)



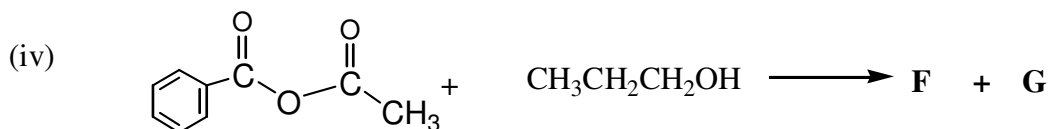
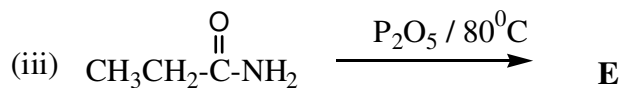
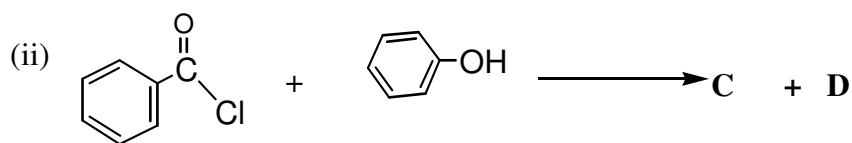
3. (a) Give the structures of the following compounds:

- (i) Isopropyl benzoate (ii) Cyclopentane carboxamine
 (iii) phenylethanoylchloride. (iv) Benzoic-ethanoic anhydride (4 mks)

(b) Outline the synthesis of the following compounds using appropriate reagents;

- (i) Phenylpropanoate (ii) benzoylchloride
 (iii) N-methyl – cyclohexane carboxamine (iv) Benzoic – Ethanoic anhydride. (6.5 mks)

(c) Give the structures and the names of the product(s) formed in the following reactions; (7 mks)



4. (a) (i) Explain why aromatic amines (Ar-NH_2) are weaker bases than aliphatic amines (R-NH_2)
- (ii) Amines are classified into 1° , 2° , and 3° amines. Which class of amines is the most basic? Explain. (5 mks)
- (b) Outline the synthesis of the following amines using appropriate reagents;
- (i) Isopropylamine (ii) *N*-ethylbenzamine starting from nitrobenzene (5 mks)
- (c) Complete the following reaction equations: (7.5 mks)

