

KABARAK



UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

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

COURSE CODE: CHEM 312

COURSE TITLE: ORGANIC CHEMISTRY III

STREAM: Y3S1

DAY: TUESDAY

TIME: 2.00 - 4.00 P.M.

DATE: 09/12/2008

INSTRUCTIONS:

Attempt all questions

Total marks = 70 (each question = 17.5 Mks)

PLEASE TURN OVER

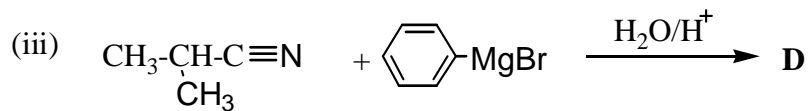
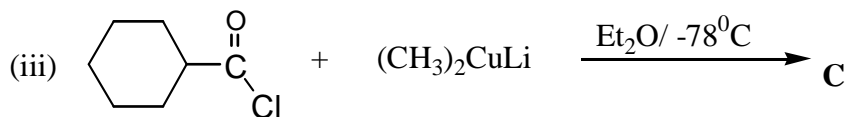
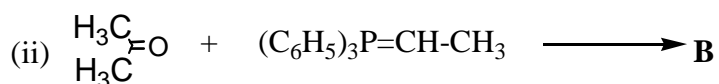
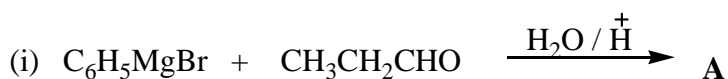
1.(a) (i) Which of the following aldehydes is most reactive: 2-methylpropanal, ethanal or methanal? Explain:

(ii) Arrange the following molecules according to their decrease in reaction order, isopentyl-tet-butyl ketone, propanone and ethanal. Explain the order. (6 mkS)

(b) Outline all steps for the synthesis of each of the following using suitable organic reagents. (i) *p*-bromobenzaldehyde starting from benzene.

(ii) *n*-propyl-isobutyl ketone (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) In an aldol reaction excess 2-butanone was reacted with a strong base, sodium ethoxide ($\text{CH}_3\text{CH}_2\text{O}^-\text{Na}^+$) to form a β -hydroxyketone compound. Give the mechanism of the reaction and structure of the product. (5 mks)

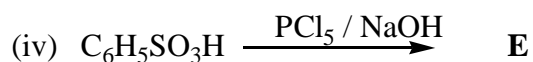
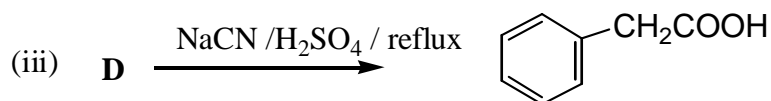
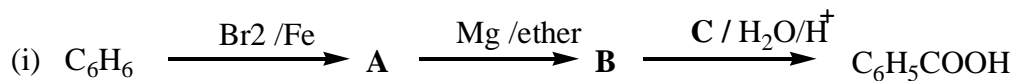
(ii) Explain using mechanism how α - alkylation of cyclopentanone can be done using suitable reagents. (3.5 mks)

(b) Which of the following carboxylic acids is most acidic in the following pair?

(i) 2-chloropropanoic acid or propanoic acid. Explain.

(ii) *p*-aminobenzoic acid and benzoic acid. Explain (4 mks)

(c) Complete the following equation reaction and give the name of the missing reactants/ reagent or product. (5 mks)



3 (a) Give the structural formulae of the following compounds:

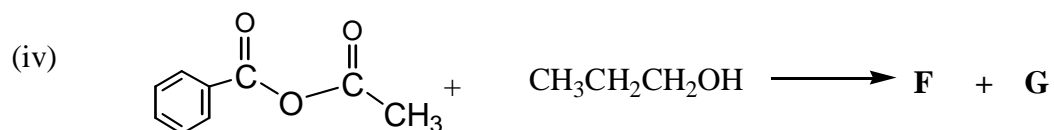
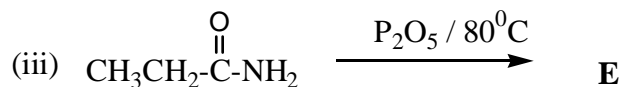
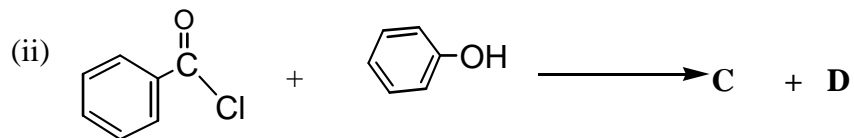
- (i) Isopropyl benzoate (ii) Cyclopentane carboxamine
 (iii) Phenylethanoylchloride (iv) Benzoic-ethanoic anhydride. (4 mks)

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

- (i) Phenylpropanoate (ii) benzoylchloride
 (iii) N-methyl – cyclohexane carboxamine (iii) 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 amines are considered to be basic compounds with $\text{P}^{\text{H}} > 8$.

(ii) Arrange the following amines in their order of increasing basicity;

Tert-butylamine, Isobutylamine and *n*-butylamine. Explain the order. (5 mks)

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

(i) *n*-pentylamine (ii) *N*-ethylbenzamine starting from nitrobenzene

(5mks)

(c) Complete the following reaction equations:

(7.5 mks)

