OCR A2 CHEMISTRY

TOPIC 4.1.2

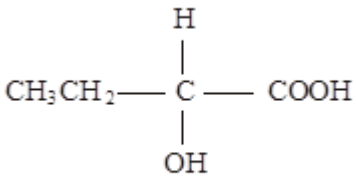
CARBONYL COMPOUNDS

TOPIC 4.1.3

CARBOXYLIC ACIDS AND ESTERS

TOTAL 48 MARKS

1. Consider the compound R:



R

Draw the structure of the main organic product formed in each case when **R** reacts separately with the following substances:

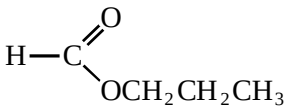
(i) methanol in the presence of a few drops of concentrated sulphuric acid;

(ii) acidified potassium dichromate(VI);

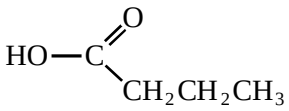
(iii) concentrated sulphuric acid in an elimination reaction.

(3)
(Total 3 marks)

2. (a) Consider the following pair of isomers.



C



D

(i) Name compound **C**.

.....

(ii) Identify a reagent which could be used in a test-tube reaction to distinguish between **C** and **D**. In each case, state what you would observe.

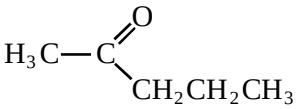
Reagent .....

*Observation with **C*** .....

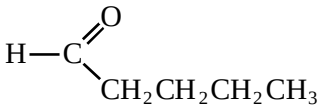
*Observation with **D***.....

(4)

(b) Consider the following pair of isomers.



E



F

(i) Name compound **E**.

.....

(ii) Identify a reagent which could be used in a test-tube reaction to distinguish between **E** and **F**. In each case, state what you would observe.

Reagent .....

*Observation with **E*** .....

*Observation with **F***.....

(4)

(Total 8 marks)

3. (a) (i) Write an equation for the reaction of butan-2-ol with ethanoic acid, showing clearly the structure of the organic product.

(ii) Name the type of organic compound formed in part (a)(i) and suggest a use for this compound.

Type of compound.....

Use.....

(iii) Give a homogeneous catalyst for the reaction in part (a)(i) and state the meaning of the term *homogeneous.*

Catalyst.....

Meaning of homogeneous.....

.....

(6)

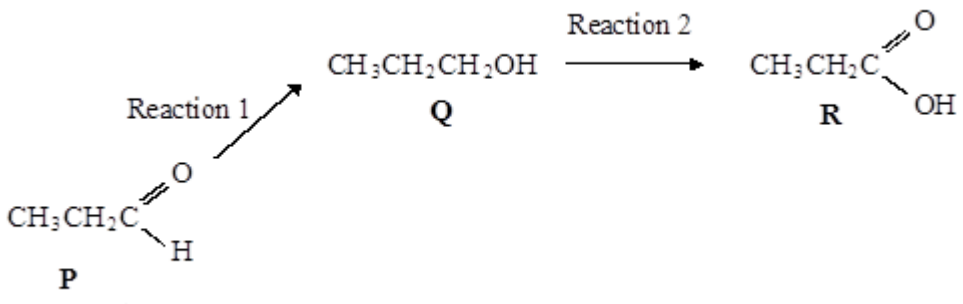
(b) Write an equation for the complete combustion of butan-2-ol in an excess of oxygen.

.....

(1)

(Total 7 marks)

4. Consider the following reaction scheme.



(a) Give the reagent(s) for Reaction 1 and name the type of reaction involved.

Reagent(s).....

Type of reaction.....

(2)

(b) (i) Give the reagent(s) and conditions for Reaction 2.

Reagent(s).....

Conditions.....

(ii) Write an equation for this reaction using the symbol [O] to represent the oxidising agent.

(4)

(c) (i) Draw the structure and state the name of the organic product formed when **Q** reacts with **R.**

Structure

Name .....

(ii) Draw the structure of an isomer of **R** which forms ethanol on hydrolysis.

(3)

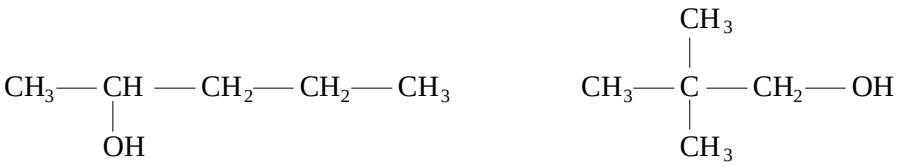
(d) Write an equation for the complete combustion of **P.**

.....

(2)

(Total 11 marks)

5. The structures of two alcohols of formula $C_5H_{11}OH$ are shown below.



pentan–2–ol

2.2–dimethylopropan–1–ol

(i) A third alcohol of formula $C_5H_{11}OH$ is tertiary. Draw the graphical formula and give the name of this alcohol.

Graphical formula

Name.....

(2)

(ii) Draw the graphical formulae of **two** alkenes formed when pentan-2-ol is heated with concentrated sulphuric acid.

(2)

(iii) State the type of reaction taking place in (a)(ii).

.....

(1)

(iv) Explain why the type of reaction taking place in (a)(ii) does not occur when 2,2-dimethylpropan-1-ol is heated with concentrated sulphuric acid.

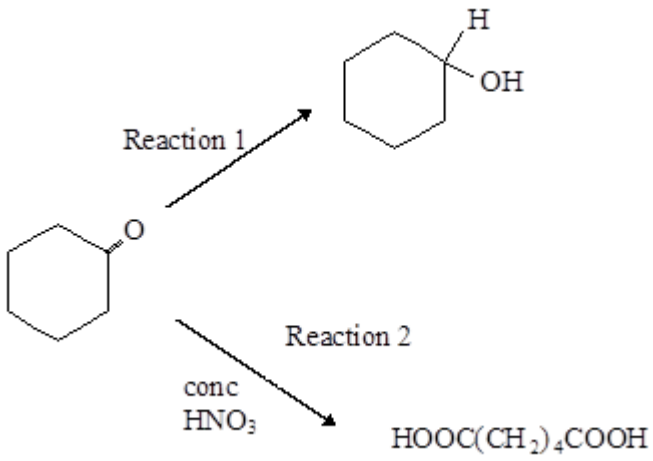
.....

.....

(1)

(Total 6 marks)

6. Consider the following two reactions of cyclohexanone, $C_6H_{10}O$.



(a) Give a suitable reagent for Reaction 1.

.....

(1)

(b) (i) Name the organic product of Reaction 3.

.....

(ii) Calculate the maximum mass of this organic product that could be formed if 2.40 g of cyclohexanone were allowed to react in Reaction 3.

.....

.....

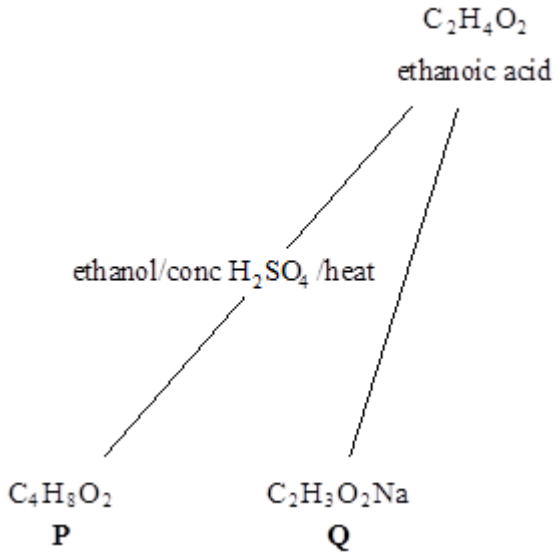
.....

.....

(4)

(Total 5 marks)

7. The molecular formulae of some compounds that can be prepared trom ethanoic acid are given in the scheme below.



(a) (i) Give the name and graphical formula of **P**.

Name.....

Graphical formula

(2)

(ii) Give the name of the type of reaction which occurs when **P** is formed from ethanoic acid.

.....

(1)

(b) Ethanoic acid can be obtained from **P**.

(i) Give the name of the reagent(s) and state the conditions required.

.....

(2)

(ii) Write a balanced equation for the reaction

.....

(1)

(c) State the reagent and reaction conditions that could be used for converting ethanoic acid into **Q**.

.....

(2)

(Total 8 marks)