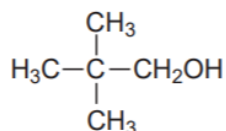


CHAPTER 31 ORGANIC SYNTHESIS AND ANALYSIS

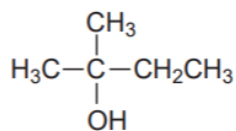
- 1 Describe how you could distinguish between the compounds in the following pairs using **one** simple test-tube reaction in each case.

For each pair, identify a reagent and state what you would observe when both compounds are tested separately with this reagent.

(a)



R



S

Reagent

Observation with **R**

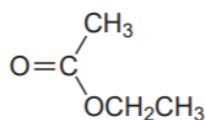
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Observation with **S**

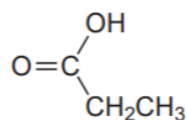
.....

(3 marks)

(b)



T



U

Reagent

Observation with **T**

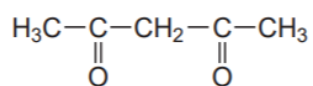
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Observation with **U**

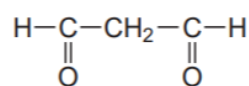
.....

(3 marks)

(c)



V



W

Reagent

Observation with **V**

.....

Observation with **W**

.....

(3 marks)

2

A chemist discovered four unlabelled bottles of liquid, each of which contained a different pure organic compound. The compounds were known to be propan-1-ol, propanal, propanoic acid and 1-chloropropane.

Describe four **different** test-tube reactions, one for each compound, that could be used to identify the four organic compounds.

Your answer should include the name of the organic compound, the reagent(s) used and the expected observation for each test.

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(8 marks)

3

Chemists have to design synthetic routes to convert one organic compound into another.

Propanone can be converted into 2-bromopropane by a three-step synthesis.

Step 1: propanone is reduced to compound **L**.

Step 2: compound **L** is converted into compound **M**.

Step 3: compound **M** reacts to form 2-bromopropane.

Deduce the structure of compounds **L** and **M**.

For each of the three steps, suggest a reagent that could be used and name the mechanism.

Equations and curly arrow mechanisms are **not** required.

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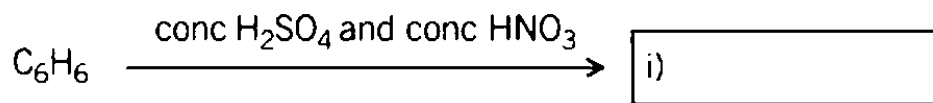
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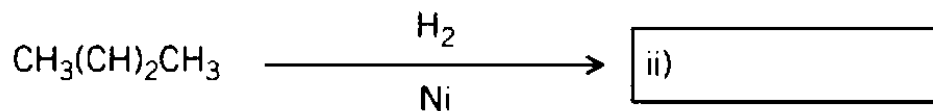
(8 marks)

- 4 (a) Complete the diagram by giving the structural formula of the product in each of the boxes provided.

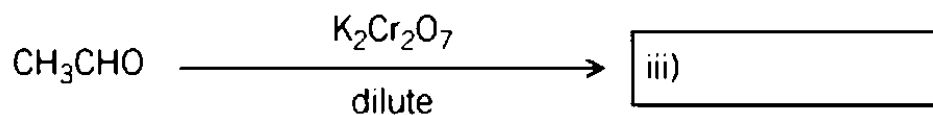
Reaction 1



Reaction 2



Reaction 3



(3 marks)

- (b) (i) State the role of the concentrated sulfuric acid in **Reaction 1**.

.....
.....
(1 mark)

- (ii) State the role of the nickel in **Reaction 2**.

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(1 mark)

- (iii) Why is potassium dichromate(VI) used in **Reaction 3**?

.....
.....
(1 mark)

- 5 A chemist is given a sample of a halogenoalkane labelled **compound A**. Explain how the chemist could test to see if **compound A** was a chloroalkane. Describe the test the chemist could carry out and how they could use the results of the test to confirm whether or not **compound A** is a chloroalkane.

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(4 marks)

- 6 One mole of **compound X** has a mass of 58.0g. A chemist tests the compound by warming a sample of **X** with Fehling's solution. The chemist observes that the Fehling's solution turns from a blue solution to a red precipitate.

(a) What type of substance is **compound X**?

.....

(1 mark)

(b) Name **compound X**

.....

(1 mark)

- 7 Describe how a chemist could test for the presence of the **alkene** functional group. Describe how to carry out the test and how to interpret the results of the test.

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(2 marks)