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CHEMISTRY

ORGANIC CHEMISTRY

Level & Board	AQA (A-LEVEL)
TOPIC:	ORGANIC ANALYSIS
PAPER TYPE:	QUESTION PAPER - 2
TOTAL QUESTIONS	10
TOTAL MARKS	26

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Organic Analysis - 2

1. The fermentation of glucose from crops is the main method for the production of ethanol.

The product is called bioethanol.

The European Union has declared that bioethanol is carbon-neutral.

(a) State the meaning of the term carbon-neutral.

(1)

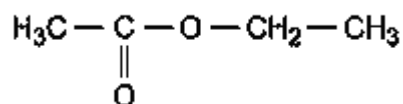
(b) Other than carbon-neutrality, state the main advantage of the use of glucose from crops as the raw material for the production of ethanol.

(1)

(c) Give one disadvantage of the use of crops for the production of ethanol.

(1)

2. Which statement does not support the suggestion that an unknown organic compound is

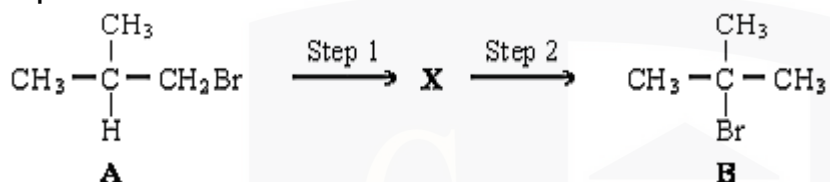


A. Its ¹H NMR spectrum has 3 peaks with an integration ratio of 2:3:3

- B. Its ^{13}C NMR spectrum has 3 peaks.
 C. Its infrared spectrum has an absorption at 1735 cm^{-1}
 D. It has 36.36% by mass of oxygen and 9.09% by mass of hydrogen.

(1)

3. The conversion of compound A into compound B can be achieved in two steps as shown below.



The intermediate compound, X, has an absorption at 1650 cm^{-1} in its infra-red spectrum.

- (a) Identify compound X. Explain your answer.

(2)

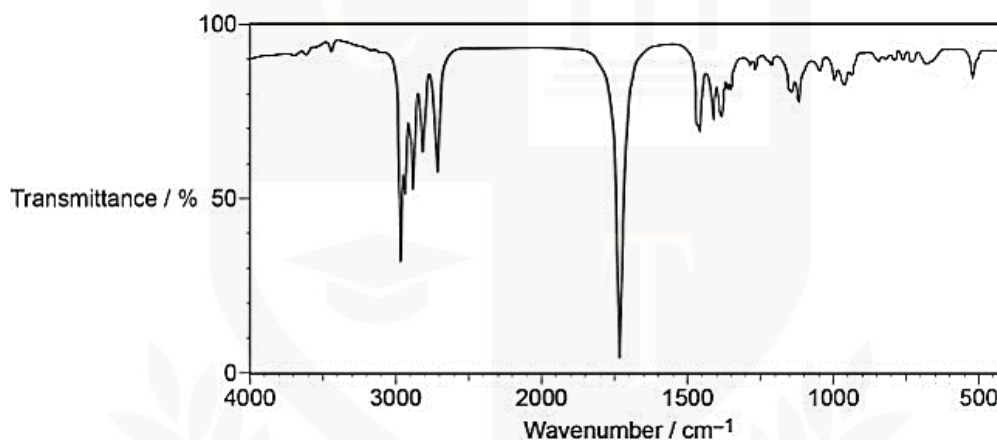
- (b) For each step in this conversion, give the reagents and essential conditions required and outline a mechanism.

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(6)

4. Which compound forms a molecular ion with a different precise molecular mass from the other three?



- A. butanone
 B. cyclobutanol
 C. dimethylpropane
 D. methylpropanal

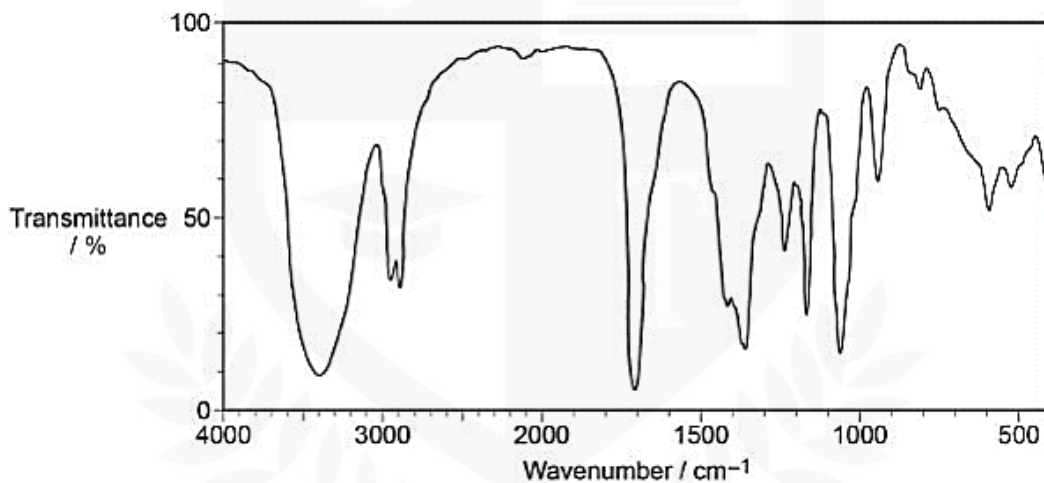
(1)

5. Explain, with the aid of equations and the intermediates that form in the ozone layer, why the European Union has banned the use of chlorodifluoromethane (CHClF_2) as a refrigerant.

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(4)

6. The infrared spectrum of an organic compound is shown. Which compound produces this spectrum?



- A. ethanoic acid
 B. 4-hydroxybutanone
 C. propan-1-ol
 D. prop-2-en-1-ol

(1)

7. The compound 2,3,3,3-tetrafluoropropene is the refrigerant used in all new car air conditioners.

(a) Draw the displayed formula for 2,3,3,3-tetrafluoropropene.

(1)

(b) Give one reason why 2,3,3,3-tetrafluoropropene is a more environmentally acceptable refrigerant than chlorodifluoromethane.

(1)

8. Which of the following compounds would form an orange-red precipitate when heated with Fehling's solution?

- A. $\text{CH}_3\text{CH}_2\text{CN}$
- B. $\text{CH}_3\text{CH}_2\text{COOH}$
- C. CH_3CHO
- D. CH_3COCH_3

(1)

9. Cyclohexane can be converted into bromocyclohexane by a reaction that is similar to the reaction of methane either with chlorine or with bromine.

Name and outline a mechanism for the reaction of methane (CH_4) with bromine to form bromomethane (CH_3Br).

Give one condition for this reaction to occur.

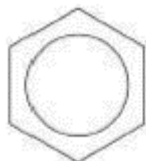
Write an equation for each step in your mechanism.

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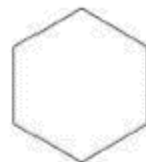
(5)

10. Which compound decolourises bromine water in the absence of sunlight?

A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$



C.



D.

$\text{CH}_3\text{CH}_2\text{CHCH}_2$

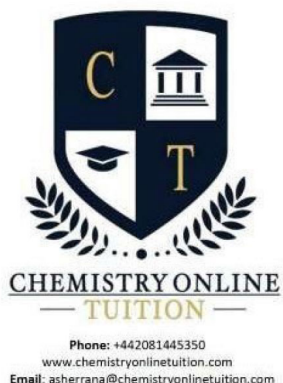
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