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CHEMISTRY

ORGANIC CHEMISTRY

Level & Board	AQA (A-LEVEL)
TOPIC:	INTRODUCTION TO ORGANIC CHEMISTRY
PAPER TYPE:	QUESTION PAPER - 2
TOTAL QUESTIONS	10
TOTAL MARKS	38

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Introduction to Organic Chemistry - 2

1. This question is about isomers with the molecular formula $C_5H_{10}O$

(a) Draw the skeletal formula of a branched chain aldehyde with molecular formula $C_5H_{10}O$ that is optically active.

(1)

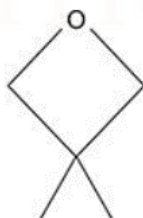
(b) Describe how you distinguish between separate samples of the two enantiomers of the branched chain aldehyde $C_5H_{10}O$

(2)

(c) Draw the E and Z forms of a structural isomer of $C_5H_{10}O$ that shows both optical and geometric isomerism.

(2)

(d) Isomer J is cyclic and has an ether functional group (C–O–C) Isomer J has only three peaks in its ^{13}C NMR spectrum.



Draw two other cyclic isomers of $C_5H_{10}O$ that have an ether functional group and only three peaks in their ^{13}C NMR spectra.

2. Which species can act as a nucleophile? (2)

- A. NH_4^+
- B. CH_3OH
- C. CH_4
- D. H^+

(1)

3. This question is about alkanes.

(a) Name the process used to separate petroleum into fractions.

(1)

(b) Give the molecular formula for an alkane with nine carbon atoms.

(1)

(c) Write an equation for the complete combustion of the alkane $\text{C}_{11}\text{H}_{24}$

(1)

(d) Write an equation for the incomplete combustion of $\text{C}_{11}\text{H}_{24}$ to produce carbon and water only.

(1)

4. How many structural isomers with an unbranched carbon chain have the molecular formula $C_4H_8Br_2$?

- A. 4
- B. 5
- C. 6
- D. 7

(1)

5. Pent-1-ene is a member of the alkene homologous series.

(a) Pent-1-ene can be separated from other alkenes.

State the physical property of alkenes that allows them to be separated from a mixture by fractional distillation.

(1)

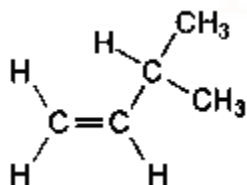
(b)

i. State the meaning of the term structural isomerism.

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(2)

ii. Name the branched chain isomer of pent-1-ene shown below.



(1)

iii. Draw the structure of a functional group isomer of pent-1-ene.

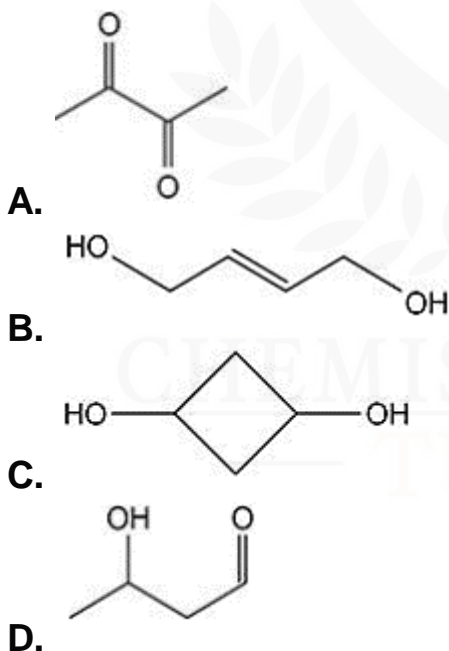
(1)

(c) The cracking of one molecule of compound X produces pent-1-ene, ethene and butane in a 1:2:1 mol ratio.

Deduce the molecular formula of X and state a use for the ethene formed.

(2)

6. Which compound has a molecular formula that is different from the others?



(1)

7. Octane is the eighth member of the alkane homologous series.

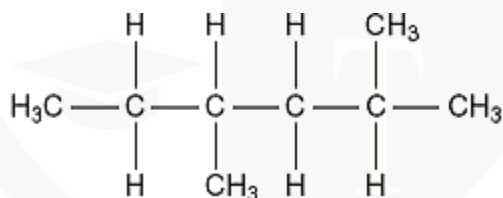
(a) State two characteristics of a homologous series.

(2)

(b) Name a process used to separate octane from a mixture containing several different alkanes.

(1)

(c) The structure shown below is one of several structural isomers of octane.



Give the meaning of the term structural isomerism.

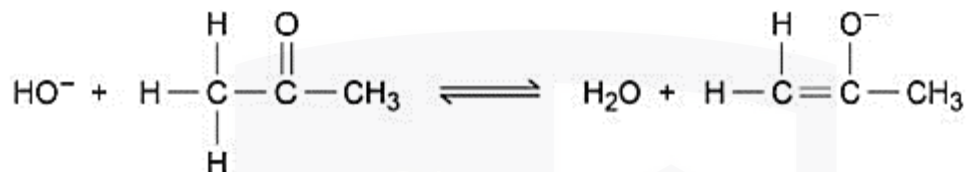
Name this isomer and state its empirical formula.

(4)

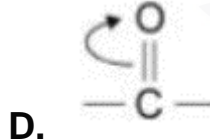
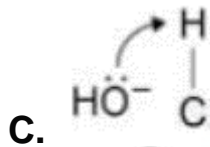
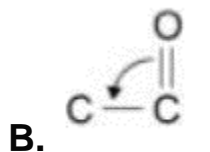
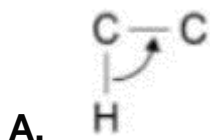
(d) Suggest why the branched chain isomer shown above has a lower boiling point than octane.

(2)

8. In concentrated alkali, propanone reacts with hydroxide ions to form an equilibrium mixture as shown.



Which curly arrow does not appear in the mechanism of this reaction?



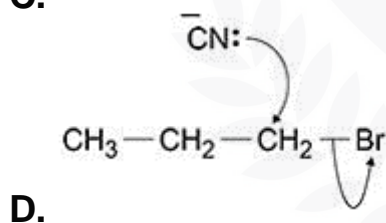
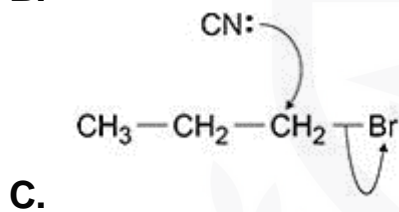
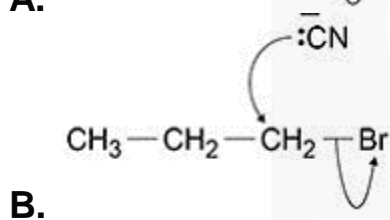
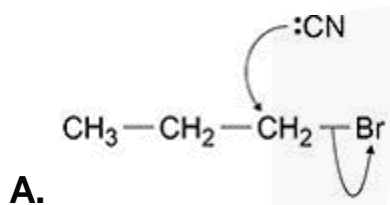
(1)

9. Write an equation for the reaction that occurs when $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$ reacts with an excess of ammonia.
Name the organic product of this reaction.

(3)

10. The question below refers to the reaction of 1-bromopropane with a solution of potassium cyanide in aqueous ethanol.

Which is the correct mechanism for the reaction?



(1)

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I am Sorry !!!!!



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