



A-Level Chemistry

Alkenes

(Multiple Choice)

Question Paper

Time available: 32 minutes

Marks available: 30 marks

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1. Which alkene shows *E*-Z isomerism?

- A 2,3-dimethylbut-2-ene
- B 4-methylpent-2-ene
- C methylpropene
- D pent-1-ene

(Total 1 mark)

2. Which compound reacts with hydrogen bromide to give 2-bromo-3-methylbutane as the major product?

- A $(\text{CH}_3)_2\text{C}=\text{CHCH}_3$
- B $(\text{CH}_3)_2\text{C}=\text{CH}_2$
- C $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{CH}_3$
- D $(\text{CH}_3)_2\text{CHCH}=\text{CH}_2$

(Total 1 mark)

3. What is the IUPAC name of the major product of the reaction between 2-ethylbut-1-ene and hydrogen bromide?

- A 1-bromo-2-ethylbutane
- B 2-bromo-2-ethylbutane
- C 2-bromo-2-methylpentane
- D 3-bromo-3-methylpentane

(Total 1 mark)

4. In which reaction does the inorganic reagent act initially as an electrophile?

- A bromoethane with ethanolic potassium hydroxide
- B chloroethane with aqueous sodium hydroxide
- C ethane with chlorine
- D ethene with concentrated sulfuric acid

(Total 1 mark)

5. What is the minimum volume of $0.0500 \text{ mol dm}^{-3}$ aqueous bromine needed to react completely with 0.0200 g of buta-1,3-diene?

(M_r of buta-1,3-diene = 54.0)

- A 7.40 cm^3
- B 14.8 cm^3
- C 29.6 cm^3
- D 67.5 cm^3

(Total 1 mark)

6. Which has *E-Z* isomers?

- A $\text{C}_2\text{H}_2\text{Br}_2$
- B $\text{C}_2\text{H}_3\text{Br}$
- C $\text{C}_2\text{H}_4\text{Br}_2$
- D $\text{C}_2\text{H}_5\text{Br}$

(Total 1 mark)

7. Which compound reacts with hydrogen bromide to give 2-bromo-3-methylbutane as the major product?

A $(\text{CH}_3)_2\text{C}=\text{CHCH}_3$

B $\text{CH}_3(\text{CH}_2)_2\text{CH}=\text{CH}_2$

C $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)=\text{CH}_2$

D $(\text{CH}_3)_2\text{CHCH}=\text{CH}_2$

(Total 1 mark)

8. Which statement is **not** correct about $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{Br}$?

A It displays *E-Z* isomerism.

B It forms an addition polymer.

C It reacts with electrophiles.

D It decolourises bromine water.

(Total 1 mark)

9. Which polymer has hydrogen bonding between its chains?

A Kevlar

B Polythene

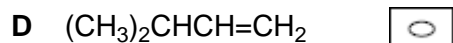
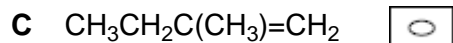
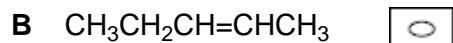
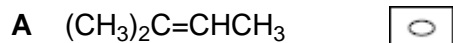
C PVC

D Terylene

(Total 1 mark)

10.

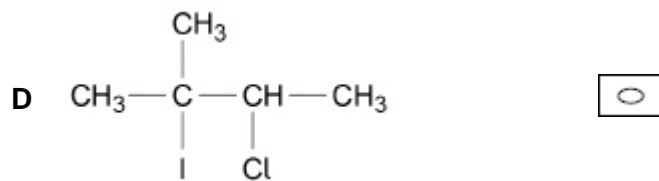
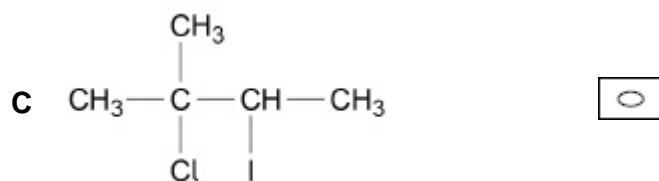
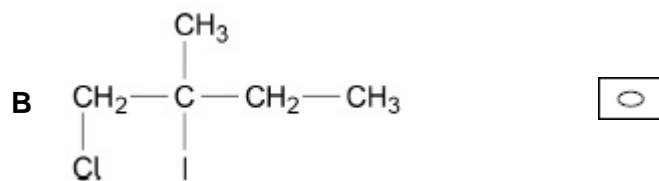
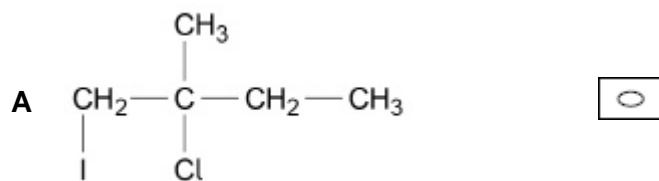
Which alkene reacts with hydrogen bromide to give 2-bromo-3-methylbutane as the major product?



(Total 1 mark)

11.

Which is the major product of the reaction between 2-methylbut-2-ene and iodine monochloride (ICl)?







(Total 1 mark)

12. Which statement is correct about poly(chloroethene)?

- A It has the empirical formula CHCl
- B It decolourises bromine water.
- C Its brittleness is reduced by plasticisers.
- D Its polymer chain contains alternate single and double bonds.

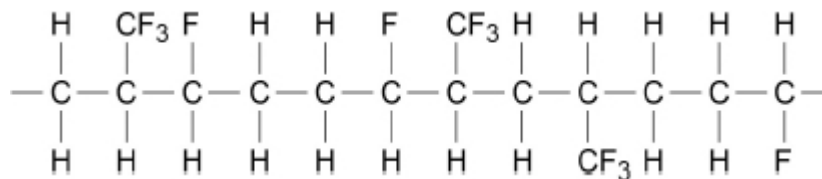
(Total 1 mark)

13. Which pair of compounds does **not** form a racemic mixture when the compounds react?

- A  + HCl
- B  + HCN
- C  + HCl
- D  + HCN

(Total 1 mark)

14. This structure shows a section of a polymer chain formed from the random polymerisation of two different monomers.



Which pair of monomers could produce this polymer?

- A $\text{CH}_2=\text{CHF}$ and $\text{CH}_2=\text{CHCF}_3$
- B $\text{CH}_2=\text{CH}_2$ and $\text{CHF}=\text{CHCF}_3$
- C $\text{CH}_2=\text{CH}_2$ and $\text{CH}_2=\text{CHCF}_3$
- D $\text{CH}_2=\text{CHF}$ and $\text{CHCF}_3=\text{CHF}$

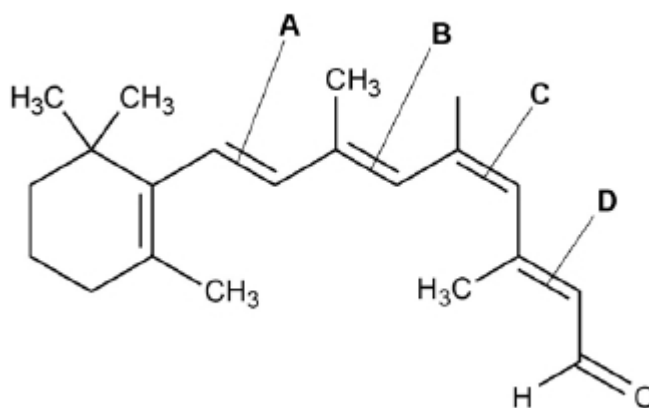
(Total 1 mark)

15.

What is the empirical formula of 4-hydroxypent-2-ene?

A $C_5H_{12}O$ B $C_5H_{10}O$ C CH_2O D C_5H_9OH **(Total 1 mark)****16.**

Z-Retinal, shown in the diagram, is a component in vitamin A.

Which of the double bonds, labelled **A**, **B**, **C** or **D**, is responsible for the letter Z in the name?A B C D **(Total 1 mark)**

17.

Consider the reaction between propene and hydrogen bromide to form the major product.

Which species is formed in the mechanism of this reaction?

- A** $\text{CH}_3\text{-C}^+\text{H-CH}_2\text{Br}$
- B** $\text{CH}_3\text{-CHBr-C}^+\text{H}_2$
- C** $\text{CH}_3\text{-C}^+\text{H-CH}_3$
- D** $\text{CH}_3\text{-CH}_2\text{-C}^+\text{H}_2$

(Total 1 mark)

18.

Which statement about *E*-1,2-dichloroethene is correct?

- A** It has the same boiling point as *Z*-1,2-dichloroethene.
- B** It forms a polymer with the same repeating unit as *Z*-1,2-dichloroethene.
- C** It has the same IR spectrum as *Z*-1,2-dichloroethene in the range $400\text{--}1500\text{ cm}^{-1}$.
- D** It has a molecular ion peak different from that of *Z*-1,2-dichloroethene in its mass spectrum.

(Total 1 mark)

19.

Which statement about ethene is correct?

- A** It has no geometric isomers because there is free rotation around the C=C bond.
- B** It reacts with HBr in a nucleophilic addition reaction.
- C** It burns in excess oxygen to produce carbon dioxide and water.
- D** The C=C bond is twice as strong as the C-C bond in ethane.

(Total 1 mark)

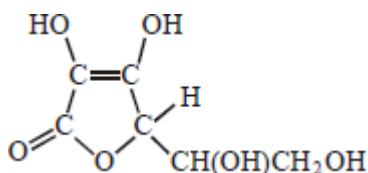
20.

What is the major product of the reaction between but-1-ene and DBr?
(D is deuterium and represents ^2H)

- A $\text{CH}_2\text{DCH}_2\text{CH}_2\text{CH}_2\text{Br}$
- B $\text{CH}_2\text{DCH}_2\text{CHBrCH}_3$
- C $\text{CH}_3\text{CH}_2\text{CHBrCH}_2\text{D}$
- C $\text{CH}_3\text{CH}_2\text{CHDCH}_2\text{Br}$

(Total 1 mark)**21.**

Which one of the following is **not** a correct statement about vitamin C, shown below?



- A It is a cyclic ester.
- B It can form a carboxylic acid on oxidation.
- C It decolourises a solution of bromine in water.
- D It is a planar molecule.

(Total 1 mark)**22.**

Which one of the following reactions will produce an organic compound that has optical isomers?

- A dehydration of butan-2-ol by heating with concentrated sulphuric acid
- B reduction of pentan-3-one by warming with NaBH_4
- C addition of Br_2 to 3-bromopropene
- D reduction of 2,3-dimethylpent-2-ene with H_2 in the presence of a nickel catalyst

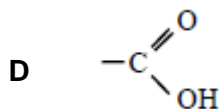
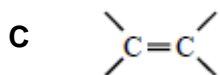
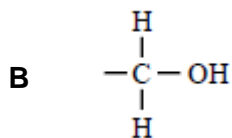
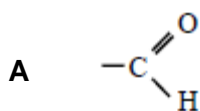
(Total 1 mark)

25.

Certain chemical tests were performed on the pain-relief drug ibuprofen. The results of these tests are given in the table below.

Test	Result
Aqueous sodium carbonate	Effervescence
Bromine water	Remained orange
Acidified potassium dichromate(VI) and heat	Remained orange
Fehling's solution and heat	Remained blue

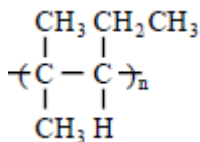
Which one of the following functional groups do these results suggest that ibuprofen contains?



(Total 1 mark)

26.

The correct name for the alkene monomer which forms the polymer shown below is



- A 2-methyl-3-ethylpropene
 B 2-methylpent-2-ene
 C 2-methylpent-3-ene
 D 4-methylpent-2-ene

(Total 1 mark)

27.

The correct systematic name for $(\text{CH}_3)_2\text{CHC}(\text{CH}_3)=\text{C}(\text{CH}_2\text{CH}_3)\text{CH}_3$ is

- A 2-ethyl-3,4-dimethylpent-2-ene
- B 4-ethyl-2,3-dimethylpent-3-ene
- C 2,3,4-trimethylhex-3-ene
- D 3,4,5-trimethylhex-3-ene

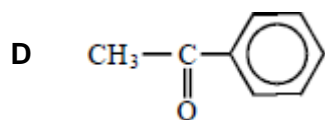
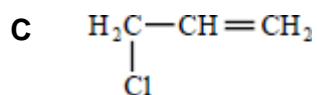
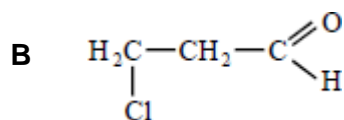
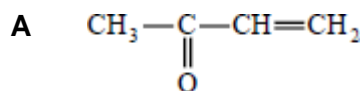
(Total 1 mark)**28.**

The correct systematic name for $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)=\text{C}(\text{CH}_2\text{CH}_3)\text{CH}_3$ is

- A 2,3-diethylbut-2-ene
- B 2-ethyl-3-methylpent-2-ene
- C 4-ethyl-3-methylpent-3-ene
- D 3,4-dimethylhex-3-ene

(Total 1 mark)**29.**

Which one of the following can react both by nucleophilic addition and by nucleophilic substitution?

**(Total 1 mark)**

30.

Which one of the following does **not** contain any delocalised electrons?

- A poly(propene)
- B benzene
- C graphite
- D sodium

(Total 1 mark)