



A-Level Chemistry

Halogenoalkanes (Multiple Choice)

Question Paper

Time available: 32 minutes

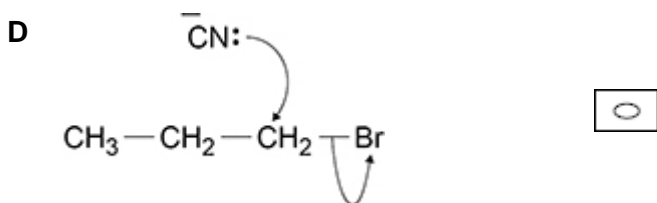
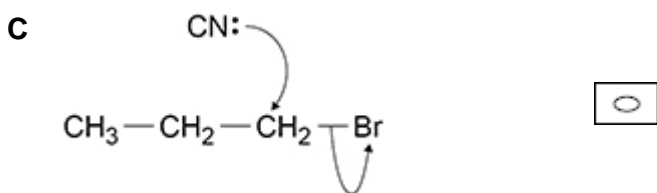
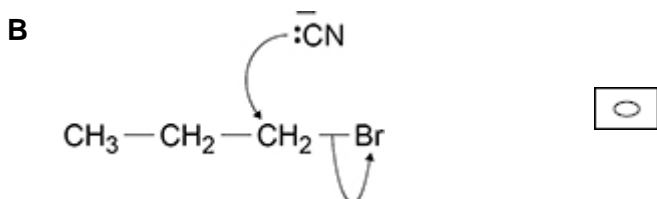
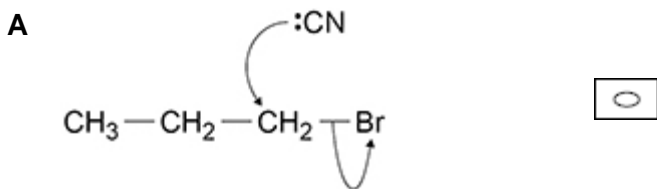
Marks available: 30 marks

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1.

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?



(Total 1 mark)

2.

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

What is the organic product of this reaction?

A propylamine

B butylamine

C propanenitrile

D butanenitrile

(Total 1 mark)

3. Which compound is **not** formed by reacting 3-bromo-3-methylhexane with warm, ethanolic potassium hydroxide?

A 2-ethylpent-1-ene

B 3-methylhex-1-ene

C 3-methylhex-2-ene

D 3-methylhex-3-ene

(Total 1 mark)

4. Which statement is **not** correct about ozone?

A It absorbs harmful ultraviolet radiation in the upper atmosphere.

B Its decomposition is catalysed by chlorine molecules.

C It decomposes to form oxygen.

D Ozone holes are regions of the upper atmosphere where there is a reduced concentration of ozone.

(Total 1 mark)

5. Which compound can react with ammonia to produce propylamine?

A $\text{CH}_3\text{CH}=\text{CH}_2$

B $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

C $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$

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

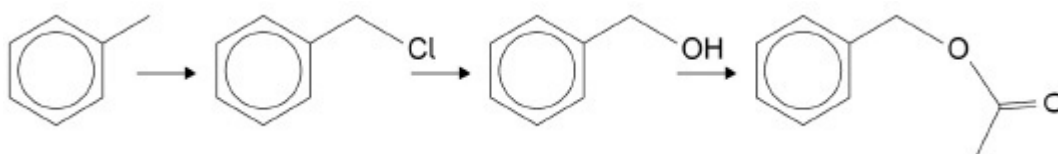
(Total 1 mark)

6. Which compound could **not** be produced by reacting 2-bromo-3-methylbutane with sodium hydroxide?

- A 2-methylbut-1-ene
- B 3-methylbut-1-ene
- C 2-methylbut-2-ene
- D 3-methylbutan-2-ol

(Total 1 mark)

7. A possible synthesis of a compound found in jasmine flower oil is shown.



Which mechanism is not used in this synthesis?

- A Electrophilic substitution
- B Nucleophilic substitution
- C Free-radical substitution
- D Nucleophilic addition-elimination

(Total 1 mark)

8. Which species could act as a nucleophile?

- A BH_3
- B NH_4^+
- C PH_3
- D SiH_4

(Total 1 mark)

9. Which of the following mechanisms does **not** occur in reactions of bromoethane?

- A Electrophilic addition
- B Elimination
- C Nucleophilic substitution
- D Radical substitution

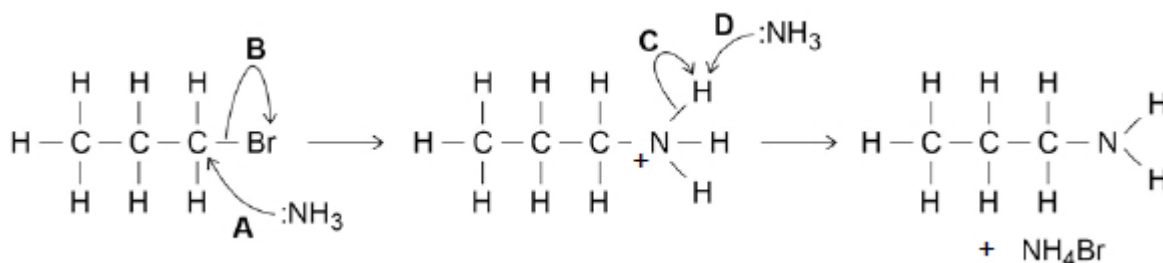
(Total 1 mark)

10. Which compound has the fastest rate of reaction with potassium cyanide to form pentanenitrile?

- A 1-bromobutane
- B 1-chlorobutane
- C 1-fluorobutane
- D 1-iodobutane

(Total 1 mark)

11. Which of the arrows, labelled **A**, **B**, **C** or **D** in the mechanism in the diagram, is **not** correct?



- A
- B
- C
- D

(Total 1 mark)

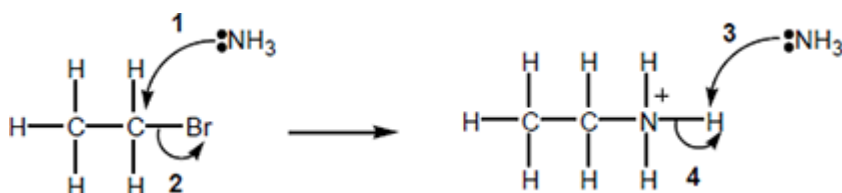
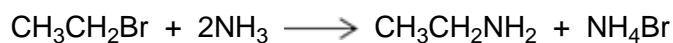
12.

Why are fluoroalkanes unreactive?

- A Fluorine is highly electronegative.
- B The F⁻ ion is very stable.
- C They are polar molecules.
- D The C-F bond is very strong.

(Total 1 mark)**13.**

This question is about a method that can be used to prepare ethylamine.

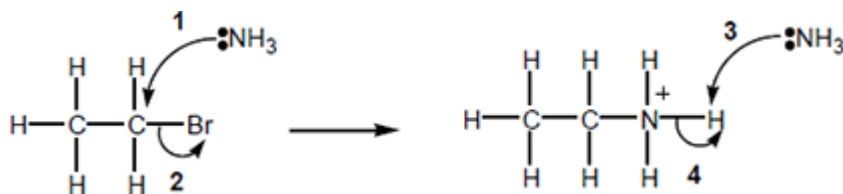
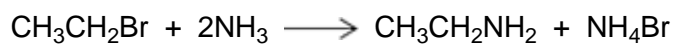
Which statement about the reaction is **not** correct?

- A Ethylamine is a primary amine.
- B The mechanism is a nucleophilic substitution.
- C Using an excess of bromoethane will prevent further reaction to form a mixture of amine products.
- D Ammonium bromide is an ionic compound.

(Total 1 mark)

14.

This question is about a method that can be used to prepare ethylamine.



Which of the curly arrows in the mechanism is **not** correct?

A 1

B 2

C 3

D 4

(Total 1 mark)

15.

How many different alkenes are formed when 2-bromo-3-methylbutane reacts with ethanolic potassium hydroxide?

A 2

B 3

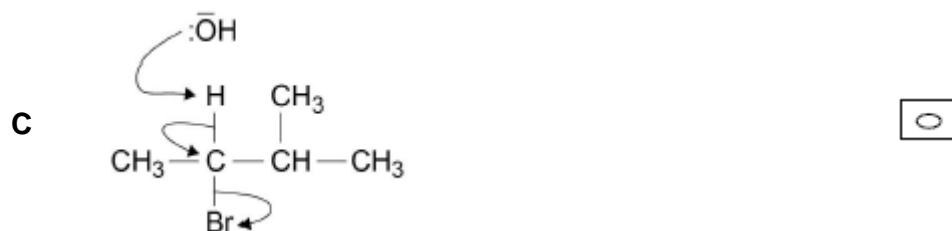
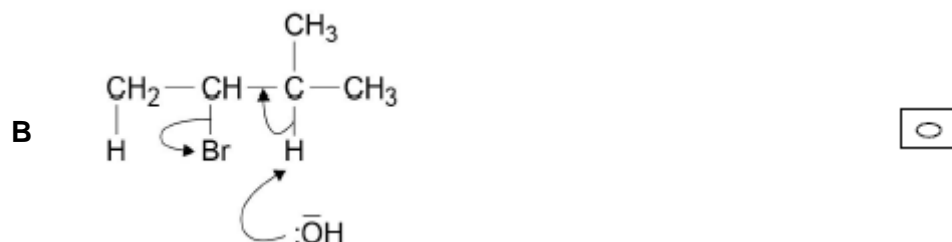
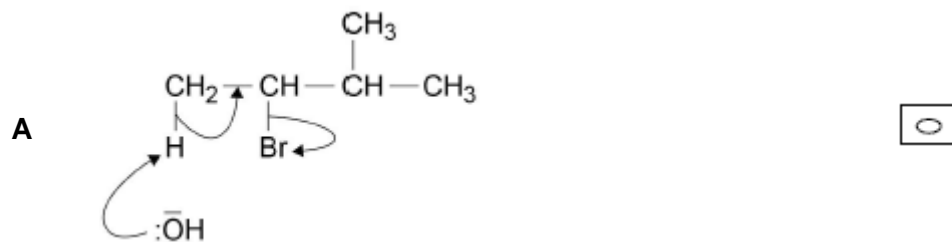
C 4

D 5

(Total 1 mark)

16.

Which of the following is a correct mechanism for the formation of 2-methylbut-2-ene from 2-bromo-3-methylbutane?



(Total 1 mark)

17.

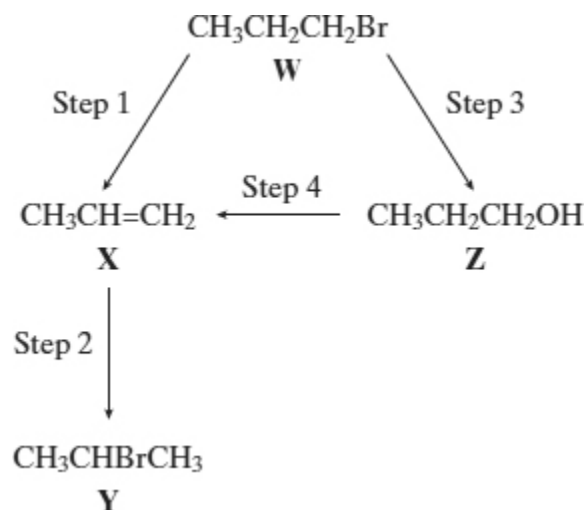
Which one of the following statements explains best why fluoroalkanes are the least reactive haloalkanes?

- A Fluorine is much more electronegative than carbon.
- B The F^- ion is the most stable halide ion.
- C The C-F bond is the most polar carbon-halogen bond.
- D The C-F bond is the strongest carbon-halogen bond.

(Total 1 mark)

18.

For this question refer to the reaction scheme below.



Which one of the following statements is **not** correct?

- A Reaction of **W** with sodium cyanide followed by hydrolysis of the resulting product gives propanoic acid.
- B Mild oxidation of **Z** produces a compound that reacts with Tollens' reagent, forming a silver mirror.
- C **Z** reacts with ethanoic acid to produce the ester propyl ethanoate.
- D **W** undergoes addition polymerisation to form poly(propene).

(Total 1 mark)

19.

How many different alkenes are formed when 2-bromo-2-methylbutane reacts with ethanolic potassium hydroxide?

- A 2
- B 3
- C 4
- D 5

(Total 1 mark)

20.

Which compound can be dehydrated to form an alkene?

- A CH_3CHO
- B CH_3COOH
- C $\text{CH}_3\text{CH}_2\text{OH}$
- D $\text{CH}_3\text{COOCH}_3$

(Total 1 mark)

21.

Which compound is formed from bromoethane in a nucleophilic substitution reaction?

A CH_3CN

B $\text{CH}_3\text{CH}_2\text{NH}_2$

C $\text{CH}_2=\text{CH}_2$

D $\text{CH}_3\text{CH}_2\text{OSO}_2\text{OH}$

(Total 1 mark)

22.

When 2-bromobutane is warmed with potassium hydroxide solution, substitution and elimination reactions both occur.

What is the role of the hydroxide ions in the elimination reaction?

A base

B catalyst

C electrophile

D nucleophile

(Total 1 mark)

23.

When 2-bromobutane is warmed with potassium hydroxide solution, substitution and elimination reactions both occur.

Which of these compounds is **not** produced?

A butan-1-ol

B butan-2-ol

C but-1-ene

D *E*-but-2-ene

(Total 1 mark)

24.

Which one of the following reactions involves nucleophilic addition?

- A $\text{CH}_3\text{CH}=\text{CH}_2 + \text{HBr} \rightarrow \text{CH}_3\text{CHBrCH}_3$
 B $\text{CH}_3\text{CH}_2\text{CH}_3 + \text{Cl}_2 \rightarrow \text{CH}_3\text{CHClCH}_3 + \text{HCl}$
 C $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{NaOH} \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{NaBr}$
 D $\text{CH}_3\text{CH}_2\text{CHO} + \text{HCN} \rightarrow \text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CN}$

(Total 1 mark)

25.

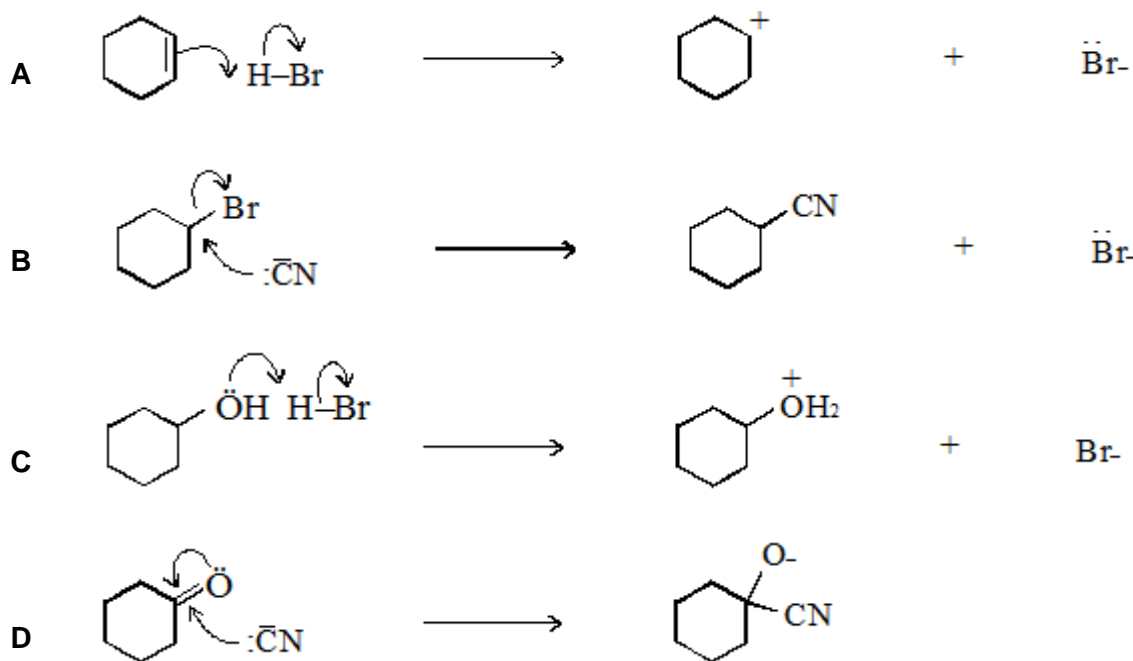
Which one of the following is **not** a suitable method for the preparation of ethanol?

- A oxidation of ethane
 B hydration of ethene
 C reduction of ethanal
 D hydrolysis of bromoethane

(Total 1 mark)

26.

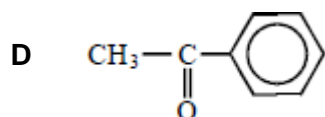
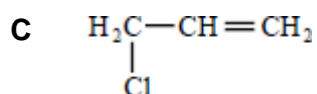
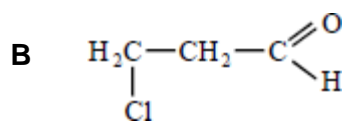
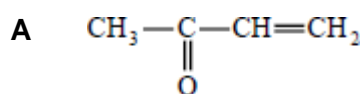
In which one of the following are the curly arrows **not** used correctly?



(Total 1 mark)

27.

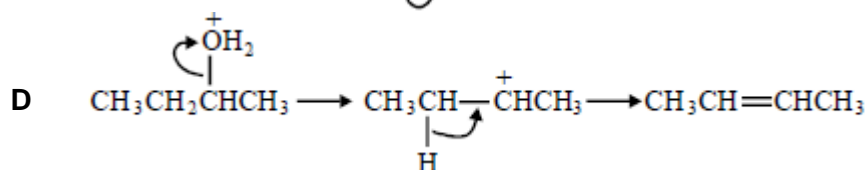
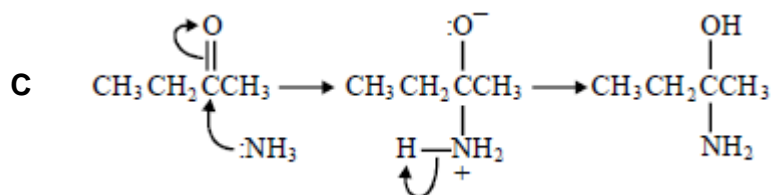
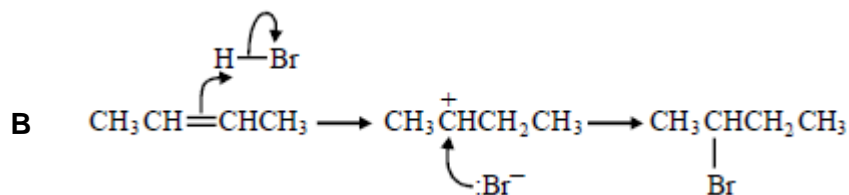
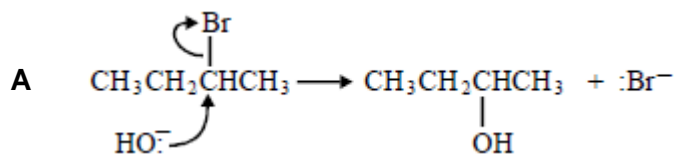
Which one of the following can react both by nucleophilic addition and by nucleophilic substitution?



(Total 1 mark)

28.

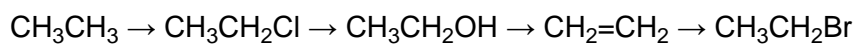
In which of the following is a curly arrow used incorrectly?



(Total 1 mark)

29.

Which one of the following mechanisms is **not** involved in the reaction sequence below?

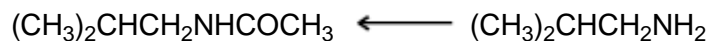
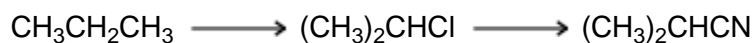


- A electrophilic addition
- B electrophilic substitution
- C nucleophilic substitution
- D free-radical substitution

(Total 1 mark)

30.

Which one of the following types of reaction mechanism is **not** involved in the above sequence?



- A free-radical substitution
- B nucleophilic substitution
- C elimination
- D nucleophilic addition-elimination

(Total 1 mark)