

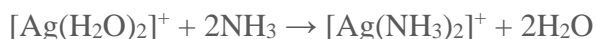
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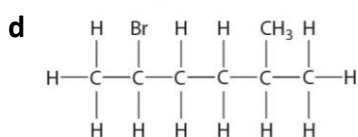
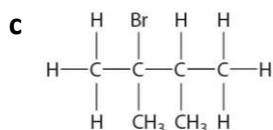
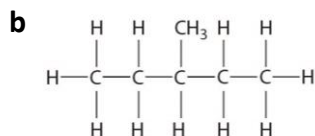
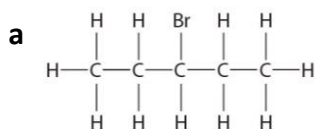
End of Chapter 22 test

This test and its sample answers have been written by the authors. IB may award marks differently.

- 1 What is the role of NH_3 in the following equation?



- A** It is a Lewis acid.
B It is a Brønsted–Lowry base.
C It is a Lewis base.
D It is neither a Lewis acid nor a Lewis base.
- 2 Which of these compounds will react most rapidly with aqueous sodium hydroxide?



- 3 Which of the following reactions is an example of a Lewis acid–base reaction but not a Brønsted–Lowry acid–base reaction?
- A** $\text{HSO}_4^-(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{SO}_4^{2-}(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$
B $[\text{Fe}(\text{H}_2\text{O})_6]^{3+} + \text{H}_2\text{O}(\text{l}) \rightleftharpoons [\text{Fe}(\text{H}_2\text{O})_5(\text{OH})]^{2+} + \text{H}_3\text{O}^+$
C $\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{NH}_3 + \text{H}_3\text{O}^+$
D $[\text{Cu}(\text{H}_2\text{O})_6]^{2+} + 4\text{NH}_3 \rightleftharpoons [\text{Cu}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+} + 4\text{H}_2\text{O}$

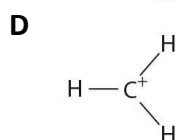
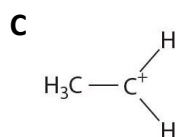
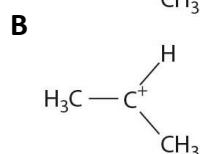
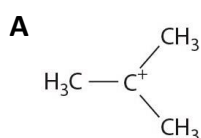
4 What is the oxidation state of Mo in the complex $[\text{Mo}(\text{NH}_3)_3\text{Br}_3]\text{NO}_3$?

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

5 The reaction between 1-bromo-2-methylhexane and aqueous sodium hydroxide is an example of

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

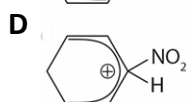
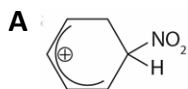
6 Which of the following carbocations is most stable?



7 C_4H_8 has three alkene isomers. How many of them can react with HCl via electrophilic addition reactions to form optically active isomers?

- A 0
- B 1
- C 2
- D 3

- 8 What is the structure of the intermediate in the reaction between benzene and a mixture of concentrated nitric acid and concentrated sulfuric acid?



- 9 Benzene can react with bromine in the presence of a catalyst and decolorise bromine. Which type of reaction is this?

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

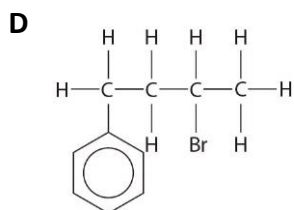
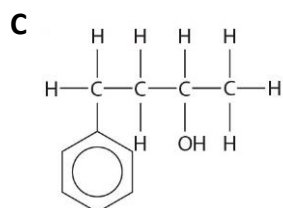
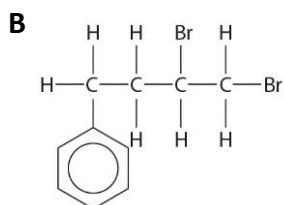
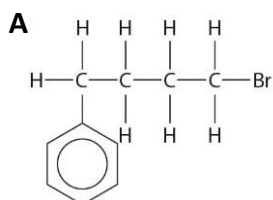
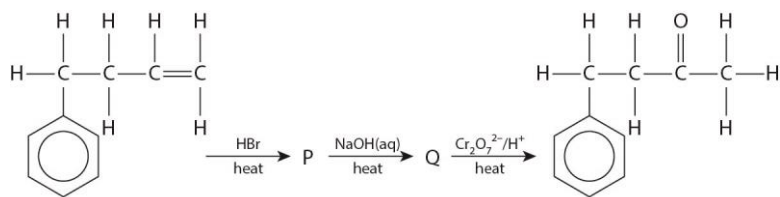
- 10 0.005 mol of an organic compound can be titrated with 0.5 mol dm^{-3} KOH(aq) with an equivalence point at 20 cm^3 . The compound also turns bromine water from orange to colourless in the dark. Which of the following could be the compound?

- A** $\text{HOCH}_2\text{CH}_2\text{COOH}$
- B** $\text{HOOCCH}_2\text{CH}_2\text{COOH}$
- C** HOOCCHCHCOOH
- D** $\text{HOOCCH}_2\text{CH}_2\text{COOH}$

- 11 What is the role of concentrated HNO_3 in the nitration of benzene?

- A** It acts as an intermediate.
- B** It acts as a catalyst.
- C** It acts as a Lewis base.
- D** It is a product.

12 A multi-stage reaction sequence is shown below. What is the identity of compound P?



END OF TEST