

PRACTICE/SL/CHEMI/HPM/ENG/TZ0/ORGANIC

Chemistry
Standard level
Paper 1A

Practice paper

Topic: Organic Chemistry

Chemistry

Standard level

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Specimen paper

45 minutes

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Answer all questions.
- For each question, choose the best answer.
- A clean copy of the chemistry data booklet is required.
- The maximum mark for this paper is [20 marks].

Section A

1. What is the IUPAC name of the compound with the formula $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$?
 - A. Hexane
 - B. 3-methylpentane
 - C. 2-ethylbutane
 - D. 3-ethylbutane
2. Which describes the relationship between members of the same homologous series?
 - A. They have the same empirical formula.
 - B. They differ by a CH_2 group and have similar chemical properties.
 - C. They have identical physical properties.
 - D. They are structural isomers of each other.
3. What is the general formula for a non-cyclic alkyne?
 - A. $\text{C}_n\text{H}_{2n+2}$
 - B. C_nH_{2n}
 - C. $\text{C}_n\text{H}_{2n-2}$
 - D. $\text{C}_n\text{H}_{2n-4}$
4. Which compound is a tertiary halogenoalkane?
 - A. 1-chlorobutane
 - B. 2-chlorobutane
 - C. 1-chloro-2-methylpropane
 - D. 2-chloro-2-methylpropane
5. What type of reaction occurs when bromine water is added to but-2-ene in the dark?
 - A. Free-radical substitution
 - B. Electrophilic addition
 - C. Nucleophilic substitution
 - D. Condensation
6. In the initiation step of the reaction between methane and chlorine, what homolytically cleaves?
 - A. The C-H bond due to heat.
 - B. The Cl-Cl bond due to UV light.
 - C. The C-H bond due to UV light.
 - D. The Cl-Cl bond heterolytically due to heat.
7. Which of the following equations represents a propagation step in the chlorination of methane?

- A. $\text{Cl}_2 \rightarrow 2\text{Cl}\cdot$
- B. $\text{Cl}\cdot + \text{CH}_4 \rightarrow \text{CH}_3\text{Cl} + \text{H}\cdot$
- C. $\text{CH}_3\cdot + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{Cl}\cdot$
- D. $2\text{CH}_3\cdot \rightarrow \text{C}_2\text{H}_6$

8. Oxidation of a secondary alcohol using acidified potassium dichromate(VI), $\text{K}_2\text{Cr}_2\text{O}_7$, produces:

- A. a primary alcohol.
- B. an aldehyde.
- C. a ketone.
- D. a carboxylic acid.

9. What are the products of the complete combustion of butane?

- A. Carbon monoxide and water
- B. Carbon dioxide and water
- C. Carbon and water
- D. Carbon dioxide and hydrogen gas

10. Which statement about the substitution reaction of primary halogenoalkanes with aqueous sodium hydroxide is correct?

- A. The mechanism is primarily $\text{S}_{\text{N}}1$.
- B. The hydroxide ion acts as an electrophile.
- C. The product is a primary alcohol.
- D. Heterolytic fission of the C-O bond occurs.

11. What is the structural formula of propyl methanoate?

- A. $\text{CH}_3\text{COOCH}_2\text{CH}_2\text{CH}_3$
- B. $\text{HCOOCH}_2\text{CH}_2\text{CH}_3$
- C. $\text{CH}_3\text{CH}_2\text{COOCH}_3$
- D. $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_3$

12. Which physical property generally increases as the carbon chain length increases in the alkane homologous series?

- A. Solubility in water
- B. Boiling point
- C. Flammability
- D. Volatility

13. What class of compound does benzene belong to?

- A. Aliphatic

- B. Aromatic
- C. Alicyclic
- D. Heterocyclic

14. What catalyst is typically required for the reaction of an alcohol with a carboxylic acid to form an ester?

- A. Concentrated sulfuric acid, H_2SO_4
- B. Nickel, Ni
- C. Iron(III) bromide, FeBr_3
- D. Acidified potassium manganate(VII), KMnO_4

15. Ethene reacts with steam at elevated temperature and pressure. What is the product?

- A. Ethane
- B. Ethanoic acid
- C. Ethanol
- D. Epoxyethane

16. Which of the following compounds can act as monomers in an addition polymerization reaction?

- I. Propene
 - II. Chloroethene
 - III. Ethanol
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

17. Which observations indicate that an unknown compound is an alkene rather than an alkane?

- I. It burns with a sootier yellow flame.
 - II. It rapidly decolorizes bromine water in the dark.
 - III. It does not react with oxygen.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

18. Which structural features are present in ethanoic acid?

- I. A carbonyl group ($\text{C}=\text{O}$)
- II. A hydroxyl group ($-\text{OH}$)

III. An ester linkage (-COO-)

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

19. Regarding the oxidation of propan-1-ol, which of the following statements are correct?

- I. It can be oxidized to propanal using distillation.
 - II. It can be oxidized to propanoic acid using heating under reflux.
 - III. The oxidation involves a color change of dichromate from green to orange.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

20. Which evidence supports the delocalized model of benzene over the Kekulé alternating double bond model?

- I. Benzene is unusually chemically stable and undergoes substitution rather than addition.
 - II. All carbon-carbon bond lengths in benzene are identical.
 - III. Benzene only contains carbon and hydrogen.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III