

CHAPTER 13

Alcohols, Phenols and Ethers

EXAM QUESTIONS

Multiple Choice

1. What is the group that distinguishes alcohols from other classes of compounds?
 a. carboxyl b. carbonyl c. hydroxy d. amide

Answer: C

2. Identify the correct statement with respect to the oxygen found in an alcohol as compared to the oxygen found in an ether.
- Oxygen is identical in both these compounds; the difference between them is determined by another factor.
 - Oxygen in an alcohol is directly associated with a hydrogen; the oxygen in an ether is not chemically bound to a hydrogen.
 - Oxygen is similar in both compounds as it is always found on a terminal carbon.
 - The oxygen in an ether is found on a side chain and that of the alcohol is not.

Answer: B

3. To which class of compounds does cholesterol belong?
- an aromatic compound
 - an ether
 - a multiple chain cyclic compound
 - an alcohol

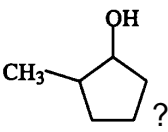
Answer: D

4. Compare glycerol with ethanol.
- They both contain 3 carbons in the skeleton.
 - They both have the hydroxy on an interior carbon.
 - Glycerol is a long chain alcohol; ethanol is a short chain alcohol.
 - Glycerol is a triol; ethanol is not a triol.

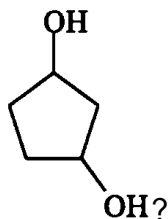
Answer: C

5. What is the correct IUPAC name for
- $$\begin{array}{c} \text{CH}_3\text{CH}_2\text{CHCH}_2\text{CH}_3 \\ | \\ \text{CH}_2 \\ | \\ \text{OH} \end{array} \quad ?$$
- 3-methylpentanol
 - 2-ethyl-1-butanol
 - 2-ethylbutanol
 - 1-ethyl-2-butanol

Answer: B

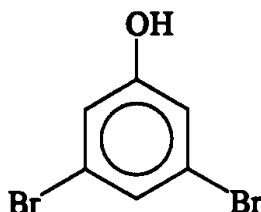
6. What is the correct IUPAC name for
- 
- 2-ethyl-1-pentanol
 - 1-ethylpentanol
 - 1-ethylcyclopentanol
 - 2-methyl-1-cyclopentanol

Answer: D



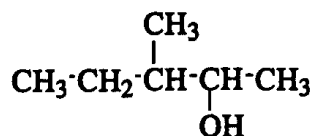
7. What is the correct IUPAC name for
- | | |
|-------------------------|-------------------------|
| a. 1,3-cyclopentadiol | c. 1,3-cyclopentanediol |
| b. 1,4-cyclopentanediol | d. 1,4-cyclopentadiol |

Answer: C



8. What is this compound named?
- | | |
|----------------------|----------------------|
| a. 1,3-dibromophenol | c. 2,4-dibromophenol |
| b. 3,5-dibromophenol | d. 1,5-dibromophenol |

Answer: B



9. What is the correct classification for this alcohol?
- | | | | |
|------------|--------------|-------------|---------------|
| a. primary | b. secondary | c. tertiary | d. quaternary |
|------------|--------------|-------------|---------------|

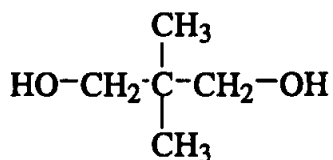
Answer: B

10. Which of the following compounds is correctly classified as a tertiary alcohol?
- | | |
|-----------------------|-----------------------|
| a. 3-methyl-1-butanol | c. 3-methyl-2-butanol |
| b. 2-methyl-1-butanol | d. 2-methyl-2-butanol |

Answer: D

11. Which of the following is a secondary alcohol?
- | | | | |
|--------------------------------------|---------------------------------|--|--------------------------------|
| a. $\text{CH}_3\text{CH}_2\text{OH}$ | b. $(\text{CH}_3)_2\text{CHOH}$ | c. $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$ | d. $(\text{CH}_3)_3\text{COH}$ |
|--------------------------------------|---------------------------------|--|--------------------------------|

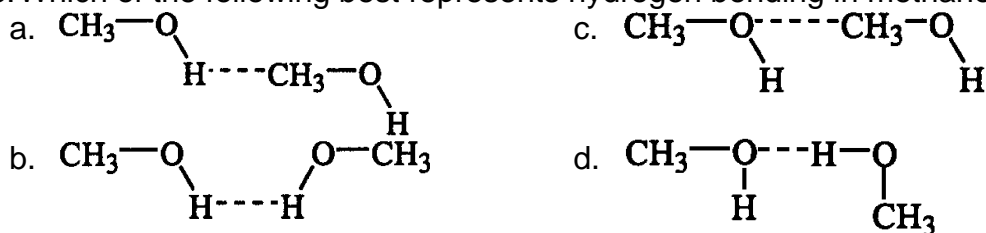
Answer: B



12. The hydroxyl groups in
- | | |
|-----------------------|---------------------------------------|
| a. both are primary | c. both are tertiary |
| b. both are secondary | d. one is primary and one is tertiary |

Answer: A

13. Which of the following best represents hydrogen bonding in methanol?



Answer: D

14. Which of the following would be only very slightly soluble in water?

- a. 1-propanol b. 2-propanol c. 1,5-pentanediol d. 1-hexanol

Answer: D

15. Which compound would be the most soluble in water?

- a. $\text{CH}_3\text{---O---CH}_2\text{---CH}_2\text{---CH}_3$ c. $\text{CH}_3\text{---CH}_2\text{---O---CH}_2\text{---CH}_3$
 b. $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---CH}_3$ d. $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---OH}$

Answer: D

16. Which compound would have the highest boiling point?

- a. $\text{CH}_3\text{---O---CH}_2\text{---CH}_2\text{---CH}_3$ c. $\text{CH}_3\text{---CH}_2\text{---O---CH}_2\text{---CH}_3$
 b. $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---CH}_3$ d. $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---OH}$

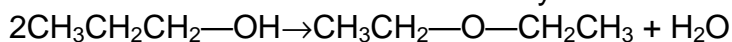
Answer: D

17. Which of the following would be made from an alcohol by a dehydration reaction?

- a. alkene b. alkane c. alkyl halide d. alkyl halide

Answer: B

18. What conditions must be used to carry out the following reaction?



- a. $\text{H}_2\text{SO}_4, 180^\circ\text{C}$ b. $\text{H}_2\text{SO}_4, 140^\circ\text{C}$ c. HCl d. NaOH

Answer: B

19. What is the organic product of the following reaction: $\text{CH}_3\overset{\text{OH}}{\text{C}}\text{HCH}_2\text{CH}_3 + (\text{O}) \longrightarrow$

- a. $\text{HC}=\text{CH}_2\text{CH}_2\text{CH}_3$ c. $\text{CH}_3\overset{\text{O}}{\text{C}}\text{---CH}_2\text{CH}_3$
 b. $\text{H}_2\text{C}=\text{CHCH}_2\text{CH}_3$ d. $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_3$

Answer: C

20. Oxidation of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{—OH}$ produces $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\text{O}}{\parallel}\text{C—H}$ which may be further oxidized to

- a. $\text{CH}_3\overset{\text{O}}{\parallel}\text{C—CH}_2\text{CH}_3$ b. $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\text{O}}{\parallel}\text{C—OH}$ c. $\text{H}_2\text{C=CHCH}_2\text{CH}_3$ d. $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_3$

Answer: B

21. Which of the following alcohols would be the most difficult to oxidize?

- a. $\text{CH}_2\text{C(OH)(CH}_3)_2$ c. CH_3OH
 b. $\text{CH}_2\text{CH(OH)CH}_2(\text{CH}_3)_2$ d. $\text{HOCH}_2\text{CH}_2\text{OH}$

Answer: A

22. Rubbing alcohol contains the alcohol

- a. $\text{CH}_2\text{CH(OH)CH}_3$ c. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
 b. $\text{CH}_2\text{C(OH)(CH}_3)_2$ d. $\text{CH}_2\text{C(OH)(CH}_3)_2$

Answer: A

23. The alcohol present in alcoholic beverages is

- a. methyl alcohol c. denatured alcohol
 b. ethyl alcohol d. wood alcohol

Answer: B

24. When phenol dissolves in water, it functions as

- a. a weak base c. an oxidizing agent
 b. a weak acid d. a reducing agent

Answer: B

25. The IUPAC name of ethyl methyl ether is

- a. 1-methoxyethane c. 2-methoxyethane
 b. ethoxymethane d. 1-ethoxymethane

Answer: A

26. Select the correct IUPAC name of $\text{CH}_3\overset{\text{CH}_3}{\underset{|}{\text{CH}}}\text{CH}_2\text{CH}_2\text{—O—CH}_3$

a. 3-methyl-1-methylbutane c. methyl-3-methylpentyl ether
 b. 1-methoxy-3-methylpentane d. 1-methoxy-3-methylbutane

Answer: D

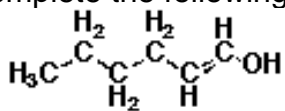
27. Ethers are _____ in water.

- a. slightly soluble c. completely insoluble
 b. very soluble d. unstable

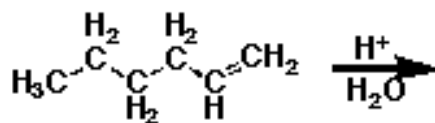
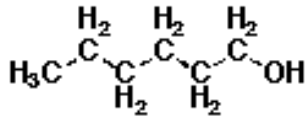
Answer: A

35. Complete the following reaction.

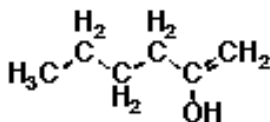
a.



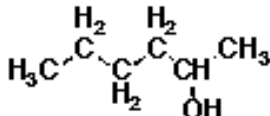
b.



c.



d.



Answer: D

True/False

1. All alcohols are produced by the processes of fermentation.
Answer: F
2. Tertiary alcohols are the most easily oxidized.
Answer: F
3. Secondary alcohols are usually oxidized to aldehydes.
Answer: F
4. Primary alcohols can be oxidized either to aldehydes or carboxylic acids.
Answer: T
5. Alcohols can form either alkenes or ethers upon dehydration.
Answer: T
6. Methyl alcohol can be dehydrated to form an alkene.
Answer: F
7. Because phenol contains a hydroxy, it is referred to as an alcohol, but the presence of the benzene ring takes phenol out of the alcohol class. The reason is that phenol is remarkably stable and is not able to react chemically as an alcohol.
Answer: F
8. The solubility of long chain alcohols possessing one hydroxy is poor due to the hydrophobic nature of the alkyl portion of the molecule.
Answer: T
9. The products of the complete oxidation of an alcohol are carbon dioxide and water.
Answer: T
10. Mercaptan is another name for a thiol.
Answer: T
11. Thiols are more easily oxidized than alcohols.
Answer: T
12. Disulfides are easily oxidized to thiols.
Answer: F
13. Thiols are not found in nature.
Answer: F
14. Heavy metal ions can bind to thiol groups.
Answer: T
15. Functional groups are usually the center of reactivity in an organic compound.
Answer: T

16. Only alcohols contain an oxygen bearing functional group.

Answer: F

17. Phenol earned a place in history as an antiseptic, but is commonly used today as an anesthetic.

Answer: F

18. Although diethyl ether was used as an anesthetic in the past, the use of diethyl ether in modern times is as a solvent.

Answer: T

19. Those persons who are allergic to the sap of the poison ivy plant are responding to a phenol, urushiol.

Answer: T

20. Vitamin E is important in the areas of antioxidants, sexual function, skin tone, and hair aging.

Answer: F