

Organic Review

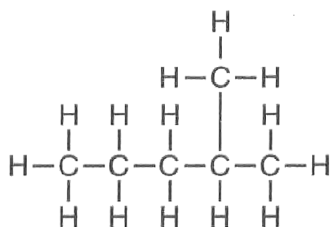
1. Which compound is a saturated hydrocarbon?

- A) propanal **B) propane**
C) propene D) propyne

2. Which compound is a member of the same homologous series as C_3H_8 ?

- A) CH_4** B) C_4H_8
C) C_5H_8 D) C_5H_{10}

3. What is the IUPAC name of the organic compound that has the formula shown below?



A) 1,1-dimethylbutane

B) 2-methylpentane

C) hexane

D) 4-methylpentane

4. Hydrocarbons are compounds that contain

- A) carbon, only
B) carbon and hydrogen, only
C) carbon, hydrogen, and oxygen, only
D) carbon, hydrogen, oxygen, and nitrogen, only

5. A molecule of a compound contains a total of 10 hydrogen atoms and has the general formula C_nH_{2n+2} .

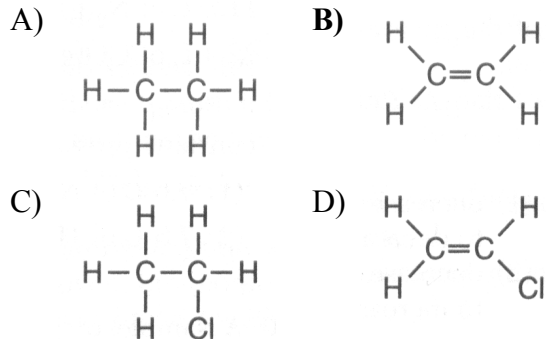
Which prefix is used in the name of this compound?

- A) but-** B) dec- C) oct- D) pent-

6. Which compound is a saturated hydrocarbon?

- A) CH_2CH_2 **B) CH_3CH_3**
C) CH_3CHO D) CH_3CH_2OH

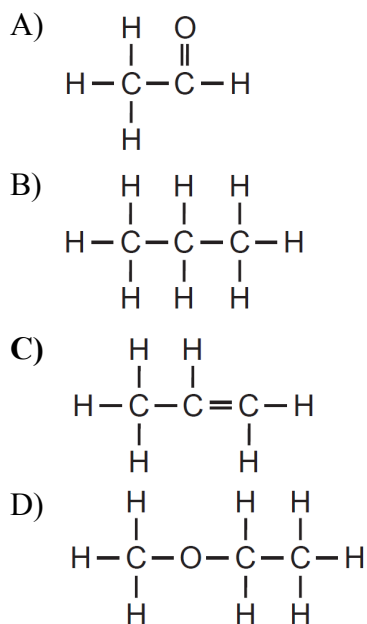
7. Which formula represents an unsaturated hydrocarbon?



8. Which formula represents an unsaturated hydrocarbon?

- A) C_5H_{12} B) C_6H_{14}
C) C_7H_{16} **D) C_8H_{14}**

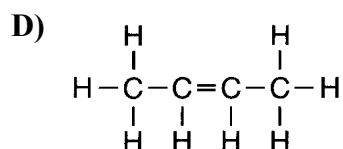
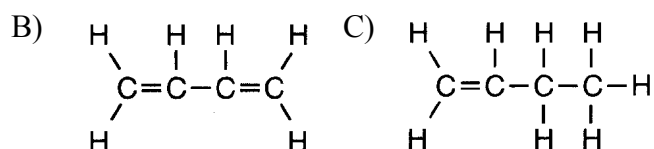
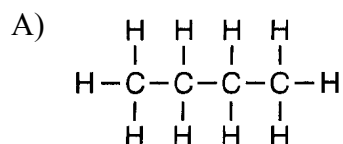
9. Which formula represents an unsaturated hydrocarbon?



10. A straight-chain hydrocarbon that has only one double bond in each molecule has the general formula

- A) C_nH_{2n-6} B) C_nH_{2n-2}
C) C_nH_{2n} D) C_nH_{2n+2}

11. Which formula represents 2-butene?



12. A carbon-carbon triple bond is found in a molecule of

- A) butane B) butanone
C) butene D) **butyne**

13. Which compound is an alkyne?

- A) **C₂H₂** B) C₂H₄
C) C₄H₈ D) C₄H₁₀

14. Which general formula represents the compound CH₃CH₂CCH?

- A) C_nH_n B) C_nH_{2n}
C) **C_nH_{2n-2}** D) C_nH_{2n+2}

15. Which compound is an unsaturated hydrocarbon?

- A) hexanal B) hexane
C) hexanoic acid D) **hexyne**

16. Which element is present in all organic compounds?

- A) **carbon** B) hydrogen
C) nitrogen D) oxygen

17. Butanal and butanone have different chemical and physical properties primarily because of differences in their

- A) **functional groups**
B) molecular masses
C) molecular formulas
D) number of carbon atoms per molecule

18. Ethanol and dimethyl ether have different chemical and physical properties because they have different

- A) **functional groups**
B) molecular masses
C) numbers of covalent bonds
D) percent compositions by mass

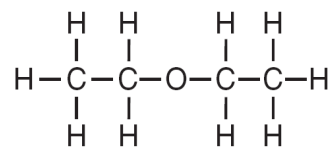
19. Which two compounds have the same molecular formula but different chemical and physical properties?

- A) CH₃CH₂Cl and CH₃CH₂Br
B) CH₃CHCH₂ and CH₃CH₂CH₃
C) CH₃CHO and CH₃COCH₃
D) **CH₃CH₂OH and CH₃OCH₃**

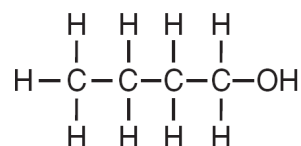
20. The isomers butane and methylpropane differ in their

- A) molecular formulas
B) **structural formulas**
C) total number of atoms per molecule
D) total number of bonds per molecule

21. Given the formulas for two compounds:



and

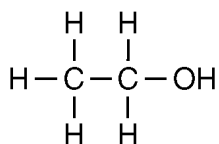


These compounds differ in

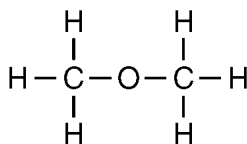
- A) gram-formula mass
B) molecular formula
C) percent composition by mass
D) **physical properties at STP**

22. Given the structural formulas:

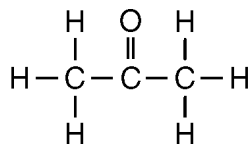
Formula A



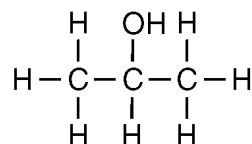
Formula B



Formula C



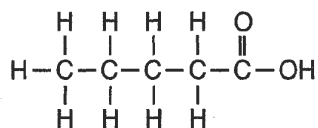
Formula D



Which two formulas represent compounds that are isomers of each other?

- A) **A and B** B) A and C C) B and D D) C and D

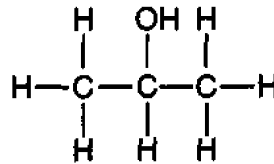
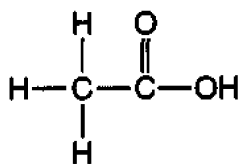
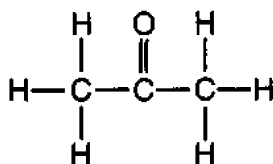
23. Given the formula for an organic compound:



This compound is classified as an

- A) aldehyde B) amine
C) ester **D) organic acid**
24. What is the total number of carbon atoms in a molecule of ethanoic acid?
- A) 1 **B) 2** C) 3 D) 4

25. Given the three organic structural formulas shown below:



Which organic compound classes are represented by these structural formulas, as shown from left to right?

- A) ester, organic acid, ketone B) ester, aldehyde, organic acid
C) ketone, aldehyde, alcohol **D) ketone, organic acid, alcohol**
-

26. Which structural formula is correct for 2-methyl-3-pentanol?

- A)
- ```

 H
 |
 H-C-H
 |
 H | H H H
 | | | | |
H-C-C-C-C-C-H
 | | | | |
 H H H H H
 |
 OH

```
- B)
- ```

      H
      |
    H-C-H
      |
  H   |   H   H   H
  |   |   |   |   |
H-C-C-C-C-C-H
  |   |   |   |   |
  H   H   |   H   H
          OH
  
```
- C)
- ```

 H
 |
 H-C-H
 |
 H | H OH
 | | | |
H-C-C-C-C-H
 | | | |
 H H H |
 H-C-H
 |
 H

```
- D)
- ```

      H   H   H   H
      |   |   |   |
    H-C-C-C-C-H
      |   |   |   |
      H   H   OH  |
              H-C-H
              |
              H
  
```

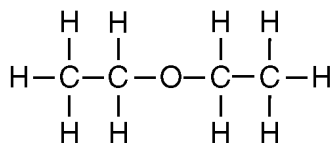
27. What is the total number of pairs of electrons shared between the carbon atom and the oxygen atom in a molecule of methanal?

- A) 1 **B) 2** C) 3 D) 4

28. The reaction between an organic acid and an alcohol produces

- A) an aldehyde B) a ketone
C) an ether **D) an ester**

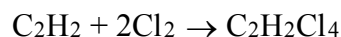
29. Given the structural formula:



The compound represented by this formula can be classified as an

- A) organic acid **B) ether**
C) ester D) aldehyde

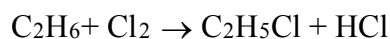
30. Given the balanced equation for an organic reaction:



This reaction is best classified as

- A) addition** B) esterification
C) fermentation D) substitution

31. Given the equation:



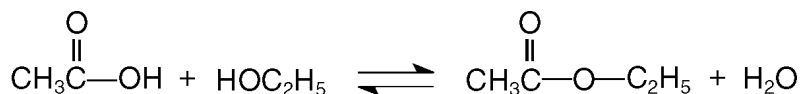
This reaction is best described as

- A) addition involving a saturated hydrocarbon
B) addition involving an unsaturated hydrocarbon
C) substitution involving a saturated hydrocarbon
D) substitution involving an unsaturated hydrocarbon

32. The reaction that joins thousands of small, identical molecules to form one very long molecule is called

- A) esterification B) fermentation
C) polymerization D) substitution

33. Given the reaction:



This reaction is an example of

- A) fermentation B) saponification C) hydrogenation **D) esterification**
-

34. What are the two main products of a fermentation reaction?

- A) ethanol and carbon dioxide**
B) ethanol and water
C) sugar and carbon dioxide
D) sugar and water

35. Which reaction results in the production of soap?

- A) esterification B) fermentation
C) polymerization **D) saponification**

Base your answers to questions **36** through **38** on the information below.

Gasoline is a mixture composed primarily of hydrocarbons such as isooctane, which is also known as 2,2,4-trimethylpentane.

Gasoline is assigned a number called an octane rating. Gasoline with an octane rating of 87 performs the same as a mixture that consists of 87% isooctane and 13% heptane.

An alternative fuel, E-85, can be used in some automobiles. This fuel is a mixture of 85% ethanol and 15% gasoline.

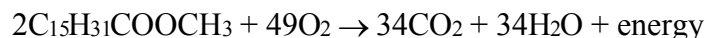
36. In the space below, draw a structural formula for a molecule of 2,2,4-trimethylpentane.

37. State the octane rating of a gasoline sample that performs the same as a mixture consisting of 92% isooctane and 8% heptane.

38. Identify the functional group in a molecule of ethanol in the alternative fuel E-85.

Base your answers to questions **39** through **43** on the information below.

Biodiesel is an alternative fuel for vehicles that use petroleum diesel. Biodiesel is produced by reacting vegetable oil with CH_3OH . Methyl palmitate, $\text{C}_{15}\text{H}_{31}\text{COOCH}_3$, a compound found in biodiesel, is made from soybean oil. One reaction of methyl palmitate with oxygen is represented by the balanced equation below.



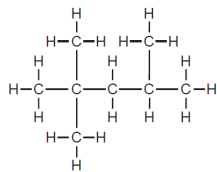
39. Identify the type of organic reaction represented by the balanced equation.
 40. Identify the class of organic compounds to which methyl palmitate belongs.
 41. Explain, in terms of *both* atoms and molecular structure, why there is no isomer of CH_3OH .
 42. Write the IUPAC name for the compound that reacts with vegetable oil to produce biodiesel.
 43. State evidence from the balanced equation that indicates the reaction is exothermic.
-

Answer Key

Organic Review

1. **B**
2. **A**
3. **B**
4. **B**
5. **A**
6. **B**
7. **B**
8. **D**
9. **C**
10. **C**
11. **D**
12. **D**
13. **A**
14. **C**
15. **D**
16. **A**
17. **A**
18. **A**
19. **D**
20. **B**
21. **D**
22. **A**
23. **D**
24. **B**
25. **D**
26. **B**
27. **B**
28. **D**
29. **B**
30. **A**
31. **C**
32. **C**
33. **D**
34. **A**
35. **D**

36.



37. 92

38. -OH *or* alcohol *or* hydroxyl

39. Example:
combustion

40. Answer: ester

41. Examples: With only one carbon atom bonded to one oxygen atom, there can be no rings or chains with branches in the molecular structure.; There are too few atoms to create a different molecular structure.

42. Answer: methanol
or methyl alcohol

43. Examples: The balanced equation shows energy as a product of the reaction.; Energy is on the right side of the arrow.