1. In the alkane family, each member differs from the preceding member by one carbon atom and two hydrogen atoms. Such a series of hydrocarbons is called
   A) a homologous series
   B) a periodic series
   C) an actinide series
   D) a lanthanide series

2. In which group could the hydrocarbons all belong to the same alkene series?
   A) C_2H_2, C_2H_4, C_2H_6  
   B) C_2H_2, C_2H_4, C_4H_8
   C) C_2H_4, C_2H_6, C_3H_6  
   D) C_2H_4, C_3H_6, C_4H_8

3. What is the geometric shape of a methane molecule?
   A) triangular  
   B) rectangular
   C) octahedral  
   D) tetrahedral

4. Which structural formula represents a molecule of butane?
   A) 
   B) 
   C) 
   D) 

5. Which organic compound is a saturated hydrocarbon?
   A) ethyne  
   B) ethene
   C) ethanol  
   D) ethane

6. What is the total number of carbon atoms contained in an ethyl group?
   A) 1  
   B) 2  
   C) 3  
   D) 4

7. Molecules of 2-methyl-propane and n-butane differ in their
   A) structural formulas  
   B) molecular formulas
   C) number of carbon atoms  
   D) number of covalent bonds

8. Which structural formula correctly represents a hydrocarbon molecule?

   A) 
   B) 
   C) 
   D) 

9. Which structural formula represents a saturated hydrocarbon?

   A) 
   B) 
   C) 
   D) 

10. Which is a saturated hydrocarbon?
    A) C_4H_8  
    B) C_4H_10
    C) C_5H_10  
    D) C_5H_12

11. Which molecular formula represents pentene?
    A) C_4H_8  
    B) C_4H_10
    C) C_5H_10  
    D) C_5H_12

12. A molecule of butane and a molecule of 2-butene both have the same total number of
    A) carbon atoms  
    B) hydrogen atoms
    C) single bonds  
    D) double bonds

13. Which formula represents an unsaturated hydrocarbon?

   A) 
   B) 
   C) 
   D) 

14. Which structural formula correctly represents a hydrocarbon molecule?
14. Which is the correct name for the substance below?

\[ \text{H} \quad \text{H} \quad \text{H} \quad \text{C} \quad \text{C} \quad \text{H} \]

A) ethanol  B) ethyne  C) ethane  D) ethene

15. What is the correct formula for butene?
A) C₄H₄  B) C₄H₆  C) C₄H₈  D) C₄H₁₀

16. Which formula represents an unsaturated hydrocarbon?

\[ \text{H} \quad \text{C} \quad = \text{C} \quad \text{H} \]

A) \[ \text{H} \quad \text{C} \quad = \text{C} \quad \text{H} \]
B) \[ \text{H} \quad \text{C} \quad = \text{H} \quad \text{H} \]
C) \[ \text{H} \quad \text{C} \quad \text{C} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \]
D) \[ \text{H} \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{H} \]

17. The empirical formula of a compound is CH₂. Which molecular formula is correctly paired with a structural formula for this compound?
A) C₂H₄  B) C₂H₄  C) C₃H₈  D) C₃H₈

18. Which formula represents an unsaturated hydrocarbon?
A) CH₂CHCl  B) CH₃CH₂Cl  C) CH₃CH₂CH₃  D) CH₃CHCH₂

19. Which formula represents an unsaturated hydrocarbon?
A) \[ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{C} \quad \text{C} \quad \text{H} \]
B) \[ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{C} \quad \text{C} \quad \text{H} \]
C) \[ \text{H} \quad \text{O} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \]
D) \[ \text{H} \quad \text{O} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \]

20. Which compound belongs to the hydrocarbon series with the general formula CₙH₂ₙ?
A) \[ \text{H} \quad \text{C} \quad = \text{C} \quad \text{H} \]
B) \[ \text{H} \quad \text{C} \quad = \text{C} \quad \text{H} \quad \text{H} \quad \text{H} \]
C) \[ \text{H} \quad \text{C} \quad = \text{C} \quad \text{H} \quad \text{H} \quad \text{H} \]
D) \[ \text{H} \quad \text{C} \quad = \text{C} \quad \text{C} \quad \text{C} \quad \text{H} \]

21. Which hydrocarbon is a member of the series with the general formula CₙH₂ₙ-2?
A) ethyne  B) ethene  C) butane  D) benzene

22. Which compound is classified as a hydrocarbon?
A) butanal  B) butyne  C) 2-butanol  D) 2-butanone

23. Which molecule contains a triple covalent bond between adjacent carbon atoms?
A) \[ \text{C} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \]
B) \[ \text{C} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \]
C) \[ \text{C} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \]
D) \[ \text{C} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \]

24. What is the total number of bonds between adjacent carbon atoms in an ethyne molecule?
A) 1  B) 2  C) 3  D) 5

25. Given the structural formula:
\[ \text{H} \quad \text{C} \quad = \text{C} \quad \text{H} \]
What is the total number of electrons shared in the bond between the two carbon atoms?
A) 1  B) 2  C) 3  D) 4

26. What is the total number of electron pairs that are shared between the two carbon atoms in a molecule of ethyne?
A) 1  B) 2  C) 3  D) 4

27. Which formula represents propyne?
A) C₃H₄  B) C₃H₆  C) C₅H₈  D) C₅H₁₀

28. Which compound has a formula which corresponds to CₙHₙ?
A) ethylene  B) methane  C) propane  D) benzene
29. Which of the following represents toluene?

A) ![Image](image1)
B) ![Image](image2)
C) ![Image](image3)
D) ![Image](image4)

30. Which compound is a member of the hydrocarbon series with the general formula \( C_nH_{2n–6} \)?

A) \( C_3H_8 \)  B) \( C_4H_8 \)  C) \( C_5H_8 \)  D) \( C_7H_8 \)

31. A toluene molecule differs from a benzene molecule in that the toluene molecule contains one additional carbon atom and

A) one additional hydrogen atom
B) two additional hydrogen atoms
C) three additional hydrogen atoms
D) four additional hydrogen atoms

32. Which compound is commonly obtained from petroleum?

A) glycerol  B) acetic acid  C) ammonia  D) propane

33. Cracking hydrocarbon molecules will result in

A) larger molecules with lower boiling points
B) larger molecules with higher boiling points
C) smaller molecules with lower boiling points
D) smaller molecules with higher boiling points

34. Which balanced equation represents a cracking reaction?

A) \( 2C_3H_6 + 9O_2 \rightarrow 6H_2O + 6CO_2 \)
B) \( C_{14}H_{30} \rightarrow C_7H_{16} + C_7H_{14} \)
C) \( C_{14}H_{28} + Cl_2 \rightarrow Cl_4H_{26}Cl_2 \)
D) \( C_2H_6 + Cl_2 \rightarrow C_2H_5Cl + HCl \)

35. Which balanced equation represents a cracking reaction?

A) \( C_4H_{10} \rightarrow C_2H_6 + C_2H_4 \)
B) \( C_4H_8 + 6O_2 \rightarrow 4CO_2 + 4H_2O \)
C) \( C_4H_{10} + Br_2 \rightarrow C_4H_9Br + HBr \)
D) \( C_4H_8 + Br_2 \rightarrow C_4H_8Br_2 \)

36. The process of separating petroleum into components based on differences in their boiling points is called

A) cracking  B) hydrogenation  C) destructive distillation  D) fractional distillation

37. Which products are obtained from the fractional distillation of petroleum?

A) esters and acids  B) alcohols and aldehydes  C) soaps and starches  D) kerosene and gasoline

38. Common bottled gases obtained from petroleum are

A) propane and butane  B) propane and carbon dioxide  C) butane and ammonia  D) butane and nitrogen

39. An atom of which element can bond covalently with four other identical atoms?

A) lithium  B) oxygen  C) fluorine  D) carbon

40. Which of the following compounds has the highest normal boiling point?

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

41. Which element is present in all organic compounds?

A) carbon  B) hydrogen  C) nitrogen  D) oxygen
42. Which structural formula is incorrect?

A) \[
\begin{array}{c}
\text{H} \\
\text{C} - \text{Cl} \\
\text{H}
\end{array}
\]

B) \[
\begin{array}{c}
\text{H} \\
\text{C} = \text{C} \ 	ext{H}
\end{array}
\]

C) \[
\begin{array}{c}
\text{O} \\
\text{H} - \text{C} - \text{OH}
\end{array}
\]

D) \[
\begin{array}{c}
\text{H} \\
\text{C} - \text{C} - \text{C} - \text{C} - \text{H}
\end{array}
\]

43. Given the structural formulas for two organic compounds:

\[
\begin{align*}
\text{H} & \text{H} & \text{H} & \text{O} \\
\text{H} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{H} \\
\text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H}
\end{align*}
\]

and

\[
\begin{align*}
\text{H} & \text{H} & \text{H} & \text{O} & \text{H} \\
\text{H} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{C} & \text{H} \\
\text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H}
\end{align*}
\]

The differences in their physical and chemical properties are primarily due to their different

A) number of carbon atoms
B) number of hydrogen atoms
C) molecular masses
D) functional groups

44. Which representation is the structural formula of an organic compound?

A) \[
\begin{array}{c}
\text{C} \ 	ext{H}_4
\end{array}
\]

B) \[
\begin{array}{c}
\text{N} \ 	ext{H}_3
\end{array}
\]

C) \[
\begin{array}{c}
\text{H} \\
\text{C} - \text{H}
\end{array}
\]

D) \[
\begin{array}{c}
\text{H} \\
\text{N} - \text{H}
\end{array}
\]

45. A general characteristic of organic compounds is that they all

A) react vigorously
B) dissolve in water
C) are strong electrolytes
D) melt at relatively low temperatures

46. The compounds 2-butanol and 2-butene both contain

A) double bonds, only
B) single bonds, only
C) carbon atoms
D) oxygen atoms

47. Which substance is an important source of organic chemical products and fuels?

A) alcohol
B) benzene
C) natural gas
D) petroleum

48. In a given homologous series of hydrocarbons, the boiling point generally increases as the size of the molecules increases. The best explanation for this statement is that in larger organic molecules

A) the number of covalent bonds per molecule is greater
B) the molecules are more symmetrical
C) more hydrogen bonding is possible
D) there are greater intermolecular forces

49. The isomers CH₃OCH₃ and CH₃CH₂OH differ in

A) molecular formula
B) molecular structure
C) number of atoms
D) formula mass

50. The compounds CH₃CH₂OCH₂CH₃ and CH₃CH₂CH₂CH₂OH are

A) hydrocarbons
B) allotropes
C) isomers
D) carbohydrates

51. Which pair of compounds are isomers?

A) NO₂ and N₂O₄
B) P₂O₅ and P₄O₁₀
C) HCOOH and CH₃COOH
D) CH₃OCH₃ and C₂H₅OH

52. The three isomers of pentane have different

A) formula masses
B) molecular formulas
C) empirical formulas
D) structural formulas

53. 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
54. Which structural formula correctly represents an organic compound?

A) \[
\begin{align*}
\text{H} & \quad \text{H} \\
\text{C} & \quad \text{C} = \text{C} \quad \text{C} \quad \text{C} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

B) \[
\begin{align*}
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{C} \quad \text{C} = \text{C} \quad \text{C} = \text{C} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

C) \[
\begin{align*}
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{C} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

D) \[
\begin{align*}
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{C} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

55. Compounds which have the same molecular formula, but different molecular structures are called

A) isomers    B) isotopes
C) allotropes  D) saturated

56. Which is an isomer of the compound propanoic acid, CH₃CH₂COOH?

A) CH₂=CHCOOH    B) CH₃CH₂CH₂COOH
C) CH₃CH(OH)CH₂OH    D) HCOOCH₂CH₃

57. Which structural formula represents an organic acid?

A) \[
\begin{align*}
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{O} \\
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

B) \[
\begin{align*}
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{O} \\
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

C) \[
\begin{align*}
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{O} \\
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

D) \[
\begin{align*}
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{C} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

58. Given the structural formula:

\[
\begin{align*}
\text{H} & \quad \text{H} \quad \text{H} \quad \text{H} \\
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{C} \\
\text{OH} & \quad \text{H} \\
\end{align*}
\]

What is the IUPAC name of this compound?

A) pentanal    B) pentanol
C) methyl pentanoate    D) pentanoic acid

59. In an aqueous solution, which compound will be most acidic?

A) CH₃COOH    B) CH₃CH₂OH
C) C₃H₅(OH)₃    D) CH₃OH

60. Which statement is true for a compound whose formula is CH₃CH₂COOH?

A) It is an alcohol.
B) It is an acid.
C) Its solution turns litmus blue.
D) Its solution turns phenolphthalein pink.

61. Which is an alcohol?

A) propanol    B) propanal
C) propene    D) propane

62. Which structural formula represents a dihydroxy alcohol?

A) \[
\begin{align*}
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{H} \\
\text{OH} & \quad \text{OH} \\
\end{align*}
\]

B) \[
\begin{align*}
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{H} \\
\text{OH} & \quad \text{OH} \\
\end{align*}
\]

C) \[
\begin{align*}
\text{H} & \quad \text{H} \\
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{H} \\
\text{OH} & \quad \text{OH} \\
\end{align*}
\]

D) \[
\begin{align*}
\text{H} & \quad \text{C} \quad \text{C} \quad \text{C} \quad \text{C} \\
\text{H} & \quad \text{H} \\
\end{align*}
\]

63. When the name of an alcohol is derived from the corresponding alkane, the final "–e" of the name of the alkane should be replaced by the suffix

A) "–al"    B) "–ol"
C) "–ane"    D) "–ase"

64. Which two compounds are monohydroxy alcohols?

A) methanol and ethanol
B) ethylene glycol and glycerol
C) methanol and ethanol
D) methanol and glycerol

65. What could be the name of a compound that has the general formula R–OH?

A) methanol    B) methane
C) methanoic acid    D) methyl methanoate

66. The compound HCHO is an example of an

A) ether    B) aldehyde
C) alcohol    D) acid
67. Which structural formula represents an aldehyde?

A) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{O} \text{H} \)  
B) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{H} \)  
C) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{O} \)  
D) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{O} \text{H} \)

68. Which is the structural formula of an aldehyde?

A) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{H} \)  
B) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{O} \)  
C) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{O} \)  
D) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{O} \text{H} \)

69. The organic compound represented by the condensed structural formula \( \text{CH}_3\text{CH}_2\text{CH}_2\text{CHO} \) is classified as an

A) alcohol  
B) aldehyde  
C) ester  
D) ether

70. 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

71. Which is the structural formula for propanone (acetone)?

A) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{C} \text{H} \)  
B) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{H} \)  
C) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{O} \text{C} \overset{\cdot}\text{H} \)  
D) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{O} \overset{\cdot}\text{C} \overset{\cdot}\text{H} \)

72. Which formula represents a ketone?

A) \( \text{HCOOH} \)  
B) \( \text{HCHO} \)  
C) \( \text{CH}_3\text{COCH}_3 \)  
D) \( \text{CH}_3\text{CH}_2\text{OH} \)

73. Which structural formula represents a ketone?

A) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{O} \text{H} \)  
B) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{O} \text{H} \)  
C) \( H\overset{\cdot}\text{O} \overset{\cdot}\text{H} \)  
D) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{O} \overset{\cdot}\text{C} \overset{\cdot}\text{H} \)

74. What is the correct IUPAC name of the following compound?

\( H\overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{H} \)  
\( \text{HCl} \)

A) ethane  
B) propane  
C) 3-chloropropane  
D) 1-chloropropane

75. Which Lewis electron-dot diagram represents chloroethene?

A) \( H\overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{Cl} \)  
B) \( \overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{Cl} \)  
C) \( \overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{Cl} \)  
D) \( \overset{\cdot}\text{C} \overset{\cdot}\text{C} \overset{\cdot}\text{Cl} \)

76. Which is an isomer of 2-chloropropane?

A) butane  
B) propane  
C) 1-chlorobutane  
D) 1-chloropropane

77. Which term identifies a type of organic reaction?

A) deposition  
B) distillation  
C) esterification  
D) sublimation

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

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

79. Which class of organic compounds has molecules that contain nitrogen atoms?

A) alcohol  
B) amine  
C) ether  
D) ketone
80. Which class of organic compounds contains nitrogen?
A) aldehyde  B) alcohol  
C) amine  D) ether

81. Which structural formula represents an ether?
A)  
\[
\begin{array}{c}
\text{H} \\
\text{\H--C--O--OH} \\
\text{H}
\end{array}
\]
B)  
\[
\begin{array}{c}
\text{H} \\
\text{\H--C--O--C--H} \\
\text{H}
\end{array}
\]
C)  
\[
\begin{array}{c}
\text{H} \\
\text{\H--C--O--H} \\
\text{H}
\end{array}
\]
D)  
\[
\begin{array}{c}
\text{H} \\
\text{\H--C--C--H} \\
\text{H}
\end{array}
\]

82. Which formula represents an ether?
A)  
\[
\text{CH}_3\text{C--O--CH}_3
\]
B)  
\[
\text{CH}_3\text{C--O--H}
\]
C)  
\[
\text{CH}_3\text{O--CH}_3
\]
D)  
\[
\text{CH}_3\text{O--H}
\]

83. What is the general formula for an ether?
A)  
\[
\text{R--OH}
\]
B)  
\[
\text{R--C--R'}
\]
C)  
\[
\text{R--O--R'}
\]
D)  
\[
\text{R--C--O--H}
\]

84. Which formula correctly represents the product of an addition reaction between ethene and chlorine?
A) \(\text{CH}_2\text{Cl}_2\)  B) \(\text{CH}_3\text{Cl}\)  
C) \(\text{C}_2\text{H}_4\text{Cl}_2\)  D) \(\text{C}_2\text{H}_3\text{Cl}\)

85. Which structural formula represents the product formed from the reaction of \(\text{Cl}_2\) and \(\text{C}_2\text{H}_4\)?
A)  
\[
\begin{array}{c}
\text{H} \\
\text{\H--C--C--H} \\
\text{Cl} \\
\text{Cl}
\end{array}
\]
B)  
\[
\begin{array}{c}
\text{Cl} \\
\text{\H--C--C--H} \\
\text{H}
\end{array}
\]
C)  
\[
\begin{array}{c}
\text{H} \\
\text{\H--C--C--Cl} \\
\text{H} \\
\text{H}
\end{array}
\]
D)  
\[
\begin{array}{c}
\text{H} \\
\text{\H--C--C--Cl} \\
\text{H} \\
\text{H}
\end{array}
\]

86. As a substitution reaction occurs, the number of electrons shared between carbon atoms
A) decreases  B) increases  
C) remains the same

87. Given the equation:
\[
\text{C}_2\text{H}_6 + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_5\text{Cl} + \text{HCl}
\]
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

88. The chaining together of small molecules to form a large molecule occurs during the process of
A) substitution  B) fermentation  
C) polymerization  D) esterification

89. The process of opening double bonds and joining monomer molecules to form polyvinyl chloride is called
A) addition polymerization  B) condensation polymerization  
C) dehydration polymerization  D) neutralization polymerization

90. Cellulose is an example of
A) a synthetic polymer  B) a natural polymer  
C) an ester  D) a ketone

91. In the reaction:
\[
\text{CH}_3\text{COOH} + \text{CH}_3\text{OH} \rightarrow \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}
\]
the organic product can best be identified as
A) an alcohol  B) a ketone  
C) an ester  D) an acid

92. Esterification is the reaction of an acid with
A) water  B) an alcohol  
C) a base  D) a salt

93. What are the products of a fermentation reaction?
A) an alcohol and carbon monoxide  B) an alcohol and carbon dioxide  
C) a salt and water  D) a salt and an acid

94. The fermentation of \(\text{C}_6\text{H}_12\text{O}_6\) will produce carbon dioxide and
A) water  B) a polymer  
C) an ester  D) an alcohol
95. When hydrocarbons burn completely in an excess of oxygen, the products are
A) carbon monoxide and water
B) carbon dioxide and water
C) carbon monoxide and carbon dioxide
D) carbon dioxide and carbon

96. In the presence of excess oxygen, hydrocarbons burn completely to form water and
A) CO  B) CO₂  C) C  D) CO₃²⁻

97. When butane burns in an excess of oxygen, the principal products are
A) CO₂ and H₂O  B) CO₂ and H₂
C) CO and H₂O  D) CO and H₂

98. In which kind of reaction is soap one of the products?
A) oxidation  B) saponification
C) neutralization  D) fermentation

99. In which reaction is soap a product?
A) addition  B) substitution
C) saponification  D) polymerization

100. The equation
CH₃OH + CH₃OH → CH₃OCH₃ + H₂O
illustrates the
A) oxidation of alcohols to form a ketone
B) oxidation of alcohols to form an acid
C) dehydration of alcohols to form a polymer
D) dehydration of alcohols to form an ether

101. Primary alcohols can be dehydrated to produce
A) ethers  B) organic acids
C) esters  D) aldehydes