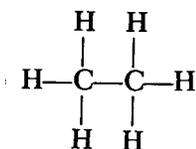
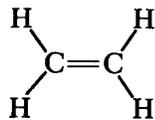


1. Which is the structural formula of methane?

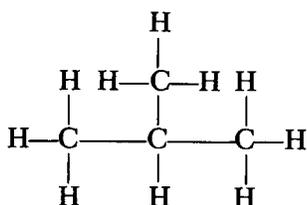
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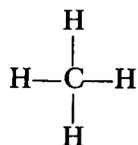
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(4)



2. In the alkane series, each molecule contains

- (1) only one double bond      (3) one triple bond  
(2) two double bonds      (4) all single bonds

3. Which type of bond occurs in a saturated hydrocarbon molecule?

- (1) single covalent bond      (3) triple covalent bond  
(2) double covalent bond      (4) ionic bond

4. Which organic compound is saturated?

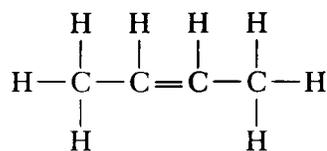
- (1) ethene      (3) propene  
(2) ethyne      (4) propane

5. 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

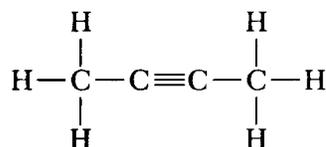
- (1) a homologous series      (3) an actinide series  
(2) a periodic series      (4) a lanthanide series

6. Which hydrocarbon is a member of the alkane series?

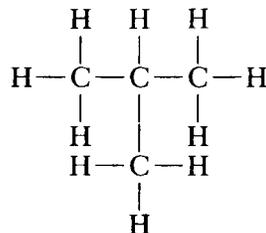
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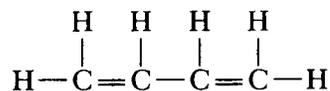
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7. How many carbon atoms are contained in an ethyl group?

- (1) 1      (3) 3  
(2) 2      (4) 4

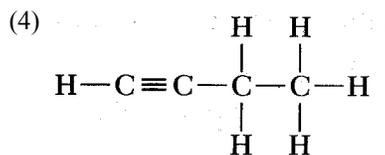
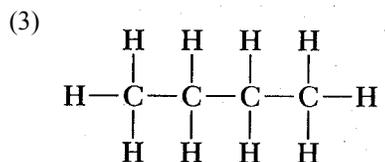
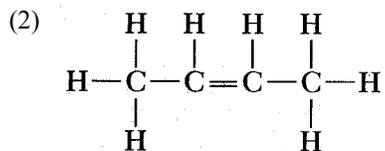
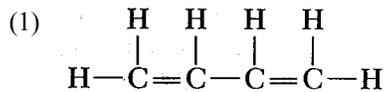
8. Which is a saturated hydrocarbon?

- (1)  $\text{C}_3\text{H}_8$       (3)  $\text{C}_2\text{H}_5\text{OH}$   
(2)  $\text{C}_6\text{H}_6$       (4)  $\text{C}_2\text{H}_4\text{O}_2$

9. Ethane is a member of the hydrocarbon series with the general formula

- (1)  $\text{C}_n\text{H}_{2n+2}$       (3)  $\text{C}_n\text{H}_{2n-n}$   
(2)  $\text{C}_n\text{H}_{2n}$       (4)  $\text{C}_n\text{H}_{2n-6}$

10. Which structural formula represents a molecule of butane?



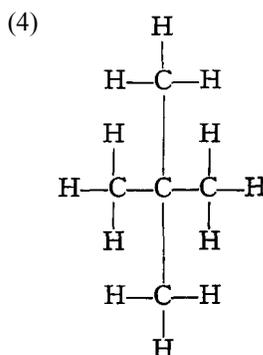
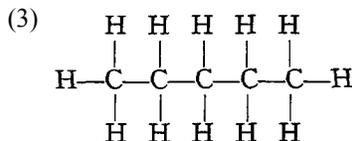
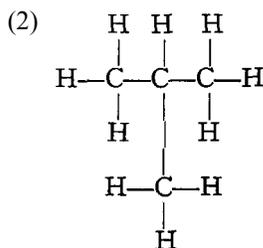
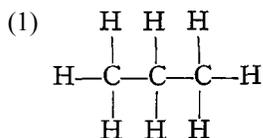
11. In a molecule of  $\text{CH}_4$ , the hydrogen atoms are spatially oriented toward the corners of a regular

- (1) pyramid (3) square  
(2) tetrahedron (4) rectangle

12. Which formula represents a saturated hydrocarbon?

- (1)  $\text{CH}_4$  (3)  $\text{C}_3\text{H}_6$   
(2)  $\text{C}_2\text{H}_4$  (4)  $\text{C}_4\text{H}_8$

13. Which is an isomer of *n*-butane?



14. The compound  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$  belongs to the series that has the general formula

- (1)  $\text{C}_n\text{H}_{2n-2}$  (3)  $\text{C}_n\text{H}_{n-6}$   
(2)  $\text{C}_n\text{H}_{2n+2}$  (4)  $\text{C}_n\text{H}_{n+6}$

15. Which compound has the molecular formula  $\text{C}_5\text{H}_{12}$ ?

- (1) butane (3) 2,2-dimethyl butane  
(2) pentane (4) 2,2-dimethyl pentane

16. Molecules of 2-methyl-propane and *n*-butane differ in their

- (1) structural formulas (3) number of carbon atoms  
(2) molecular formulas (4) number of covalent bonds

17. Which hydrocarbon is the most abundant component of natural gas?

- (1) butane (3) ethane  
(2) propane (4) methane

18. A carbon atom in an alkane has a total of

- (1) 2 covalent bonds (3) 4 covalent bonds  
(2) 2 ionic bonds (4) 4 ionic bonds

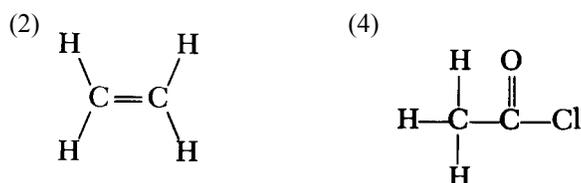
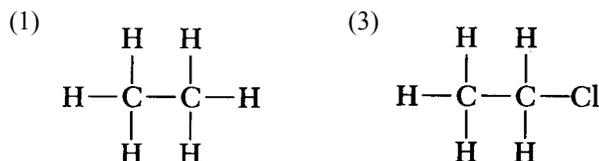
19. Which is the general formula for the alkane series of hydrocarbons?

- (1)  $C_nH_{2n+2}$  (3)  $C_nH_{2n-2}$   
(2)  $C_nH_{2n}$  (4)  $C_nH_{2n-6}$

20. Which is a saturated hydrocarbon?

- (1) ethene (3) propene  
(2) ethyne (4) propane

21. Which structural formula represents a saturated hydrocarbon?



22. Which alkane has isomers?

- (1) methane (3) propane  
(2) ethane (4) butane

23. Each member in the alkane series of hydrocarbons, when considered in successive order, has 1 more carbon atom and how many more hydrogen atoms?

- (1) 1 (3) 3  
(2) 2 (4) 4

24. All carbon-carbon bonds in a saturated hydrocarbon molecule are

- (1) single covalent (3) triple covalent  
(2) double covalent (4) coordinate covalent

25. The total number of covalent bonds in a molecule of  $C_3H_8$  is

- (1) 11 (3) 3  
(2) 10 (4) 8

26. Which compound is a saturated hydrocarbon?

- (1) methane (3) ethyne  
(2) ethene (4) ethanol

27. The compound  $C_4H_{10}$  belongs to the series of hydrocarbons with the general formula

- (1)  $C_nH_{2n}$  (3)  $C_nH_{2n-2}$   
(2)  $C_nH_{2n+2}$  (4)  $C_nH_{2n-6}$

28. Which molecule contains ten hydrogen atoms?

- (1) butane (3) propane  
(2) butene (4) propene

29. What is the total number of carbon atoms contained in an ethyl group?

- (1) 1 (3) 3  
(2) 2 (4) 4

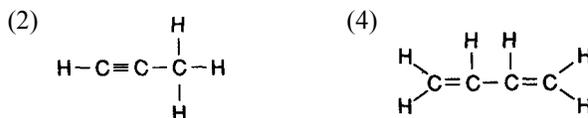
30. Which compound is a member of the alkane series?

- (1)  $C_2H_6$  (3)  $C_4H_6$   
(2)  $C_3H_6$  (4)  $C_6H_6$

31. Which of the following compounds has the greatest possible number of isomers?

- (1) butane (3) pentane  
(2) ethane (4) propane

32. Which structural formula represents a saturated compound?



33. Which formula represents butane?

- (1)  $CH_3CH_3$  (3)  $CH_3CH_2CH_2CH_3$   
(2)  $CH_3CH_2CH_3$  (4)  $CH_3CH_2CH_2CH_2CH_3$

34. A hydrocarbon molecule is considered to be saturated if the molecule contains

- (1) single covalent bonds, only  
(2) a double covalent bond, only  
(3) a triple covalent bond  
(4) single and double covalent bonds

35. As the number of carbon atoms in each successive member of a homologous hydrocarbon series increases, the number of possible isomers

- (1) decreases (3) remains the same  
(2) increases

36. Molecules of 2-methyl-propane and *n*-butane differ in their

- (1) structural formulas (3) number of carbon atoms  
(2) molecular formulas (4) number of covalent bonds

37. What is the geometric shape of a methane molecule?

- (1) triangular (3) octahedral  
(2) rectangular (4) tetrahedral

38. Which compound is a hydrocarbon?

- (1)  $\text{CH}_3\text{I}$  (3)  $\text{CH}_3\text{COOH}$   
(2)  $\text{CH}_3\text{OCH}_3$  (4)  $\text{CH}_3\text{CH}_3$

39. Ethane, ethene, and ethyne are all similar in that they are

- (1) hydrocarbons (3) saturated  
(2) unsaturated compounds (4) cyclic compounds

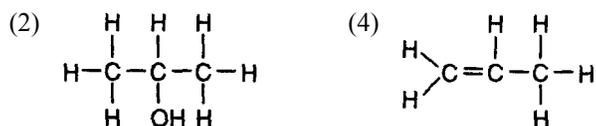
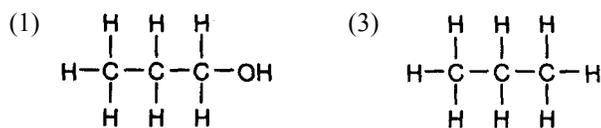
40. Which formula represents a saturated compound?

- (1)  $\text{C}_2\text{H}_4$  (3)  $\text{C}_3\text{H}_6$   
(2)  $\text{C}_2\text{H}_2$  (4)  $\text{C}_3\text{H}_8$

41. Which pair of names refers to the same compound?

- (1) ethyne and acetylene (3) ethane and acetylene  
(2) ethyne and ethene (4) ethane and ethene

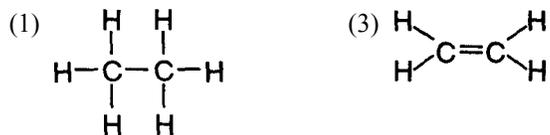
42. Which structural formula represents a saturated hydrocarbon?



43. Natural gas is mostly comprised of

- (1) butane (3) methane  
(2) ethane (4) propane

44. Which structural formula represents a saturated hydrocarbon?



45. In which group could the hydrocarbons all belong to the same alkene series?

- (1)  $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_6$  (3)  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_3\text{H}_6$   
(2)  $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_4\text{H}_8$  (4)  $\text{C}_2\text{H}_4$ ,  $\text{C}_3\text{H}_6$ ,  $\text{C}_4\text{H}_8$

46. The formula for a saturated hydrocarbon is

- (1)  $\text{C}_6\text{H}_6$  (3)  $\text{C}_6\text{H}_{12}$   
(2)  $\text{C}_6\text{H}_{10}$  (4)  $\text{C}_6\text{H}_{14}$

47. What is the general formula for the members of the alkane series?

- (1)  $\text{C}_n\text{H}_{2n}$  (3)  $\text{C}_n\text{H}_{2n-2}$   
(2)  $\text{C}_n\text{H}_{2n+2}$  (4)  $\text{C}_n\text{H}_{2n-6}$

48. Which formula represents a saturated hydrocarbon?

- (1)  $\text{C}_2\text{H}_2$  (3)  $\text{C}_3\text{H}_4$   
(2)  $\text{C}_2\text{H}_4$  (4)  $\text{C}_3\text{H}_8$

49. Which formula represents a molecule of a saturated hydrocarbon?

- (1)  $\text{C}_2\text{H}_2$  (3)  $\text{C}_5\text{H}_8$   
(2)  $\text{C}_4\text{H}_{10}$  (4)  $\text{C}_6\text{H}_6$

50. Which compound is classified as a hydrocarbon?

- (1) ethane (3) chloroethane  
(2) ethanol (4) ethanoic acid

51. In saturated hydrocarbons, carbon atoms are bonded to each other by

- (1) single covalent bonds, only  
(2) double covalent bonds, only  
(3) alternating single and double covalent bonds  
(4) alternating double and triple covalent bonds

52. Which hydrocarbon is saturated?

- (1) propene (3) butene  
(2) ethyne (4) heptane

53. Which structural formula *correctly* represents a hydrocarbon molecule?



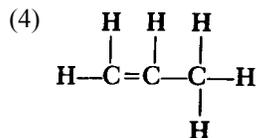
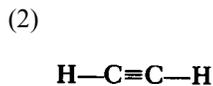
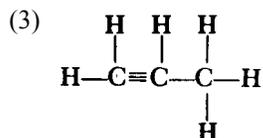
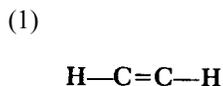
54. Which compound is a saturated hydrocarbon?

- (1) hexane (3) hexanol  
(2) hexene (4) hexanal

55. Which compound is a member of the alkene series of hydrocarbons?

- (1) benzene (3) toluene  
(2) propene (4) butadiene

56. Which is the correct structural formula of propene?



57. Which sequence represents only alkenes?

- (1)  $\text{C}_2\text{H}_2, \text{C}_2\text{H}_4, \text{C}_2\text{H}_6$       (3)  $\text{C}_2\text{H}_4, \text{C}_3\text{H}_4, \text{C}_4\text{H}_4$   
(2)  $\text{C}_2\text{H}_2, \text{C}_3\text{H}_4, \text{C}_6\text{H}_6$       (4)  $\text{C}_2\text{H}_4, \text{C}_3\text{H}_6, \text{C}_4\text{H}_8$

58. As the compounds in the alkene series are considered in order of increasing molecular mass the ratio of carbon atoms to hydrogen atoms

- (1) decreases      (3) remains the same  
(2) increases

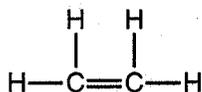
59. Which represents an unsaturated hydrocarbon?

- (1)  $\text{C}_2\text{H}_4$       (3)  $\text{C}_3\text{H}_8$   
(2)  $\text{C}_2\text{H}_6$       (4)  $\text{C}_4\text{H}_{10}$

60. A molecule of ethane and a molecule of ethene both have the same

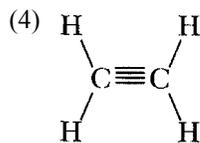
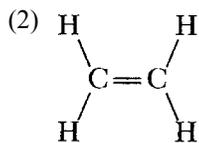
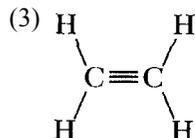
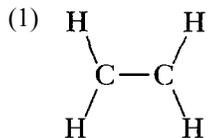
- (1) empirical formula      (3) number of carbon atoms  
(2) molecular formula      (4) number of hydrogen atoms

61. Which is the correct name for the substance below?



- (1) ethanol      (3) ethane  
(2) ethyne      (4) ethene

62. Which is the structural formula of ethene?



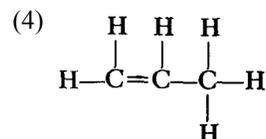
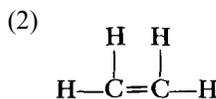
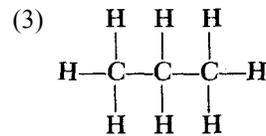
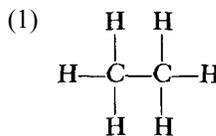
63. Which alkene consists of 4 carbon atoms?

- (1) propane      (3) butane  
(2) propene      (4) butene

64. Which formula represents an unsaturated hydrocarbon?

- (1)  $\text{C}_3\text{H}_8$       (3)  $\text{C}_3\text{H}_6$   
(2)  $\text{C}_3\text{H}_7\text{Cl}$       (4)  $\text{CCl}_4$

65. Which structural formula represents ethene?



66. In which compound does a double covalent bond exist between two carbon atoms?

- (1)  $\text{C}_2\text{H}_2$       (3)  $\text{C}_3\text{H}_8$   
(2)  $\text{C}_2\text{H}_4$       (4)  $\text{C}_4\text{H}_{10}$

67. Which compound contains a triple bond?

- (1)  $\text{CH}_4$       (3)  $\text{C}_3\text{H}_6$   
(2)  $\text{C}_2\text{H}_2$       (4)  $\text{C}_4\text{H}_{10}$

68. What is the number of hydrogen atoms in a molecule of ethyne?

- (1) 6      (3) 8  
(2) 2      (4) 4

69. Which hydrocarbon is a member of the series with the general formula  $\text{C}_n\text{H}_{2n-2}$ ?

- (1) ethyne      (3) butane  
(2) ethene      (4) benzene

70. Which compound is a member of the series which has the general formula  $\text{C}_n\text{H}_{2n-2}$ ?

- (1) ethane      (3) ethyne  
(2) ethene      (4) ethanol

71. If a hydrocarbon molecule contains a triple bond, its IUPAC name ends in

- (1) "-ane"      (3) "-one"  
(2) "-ene"      (4) "-yne"

72. Which set of formulas represents alkynes?

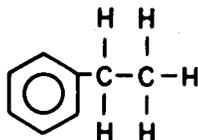
- (1)  $\text{C}, \text{CH}_4, \text{CH}_4\text{O}$       (3)  $\text{C}_2\text{H}_2, \text{C}_2\text{H}_4, \text{C}_2\text{H}_6$   
(2)  $\text{C}_2\text{H}_4, \text{C}_3\text{H}_6, \text{C}_4\text{H}_8$       (4)  $\text{CH}_2, \text{CH}_3, \text{CH}_4$

73. Which of the following represents toluene?

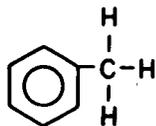
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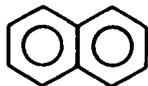
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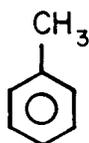
(2)



(4)



74. To which series does the hydrocarbon with the structure shown below belong?



(1) acetylene

(3) benzene

(2) olefin

(4) paraffin

75. Which formula represents the first member of the benzene series?

(1)  $C_4H_8$

(3)  $C_6H_6$

(2)  $C_5H_{10}$

(4)  $C_7H_8$

76. Which homologous series contains the compound toluene?

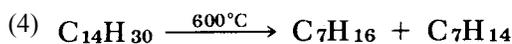
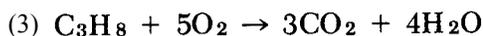
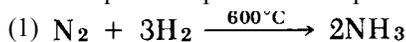
(1) alkene

(3) alkyne

(2) benzene

(4) alkane

77. Which equation represents a simple example of cracking?



78. A process in which large molecules are broken down into smaller molecules is used commercially to increase the yield of gasoline from petroleum. This process is called

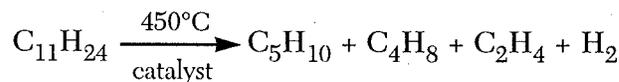
(1) polymerization

(3) esterification

(2) hydrogenation

(4) cracking

79. Given the equation:



Which type of reaction does this equation represent?

(1) addition

(3) hydrogenation

(2) cracking

(4) substitution

80. A student investigated four different substances in the solid phase. The table below is a record of the characteristics (marked with an X) exhibited by each substance.

| Characteristic Tested      | Substance A | Substance B | Substance C | Substance D |
|----------------------------|-------------|-------------|-------------|-------------|
| High Melting Point         | X           |             | X           |             |
| Low Melting Point          |             | X           |             | X           |
| Soluble in Water           | X           |             |             | X           |
| Insoluble in Water         |             | X           | X           |             |
| Decomposed under High Heat |             | X           |             |             |
| Stable under High Heat     | X           |             | X           | X           |
| Electrolyte                | X           |             |             | X           |
| Nonelectrolyte             |             | X           | X           |             |

Which substance has characteristics most like those of an organic compound?

(1) A

(3) C

(2) B

(4) D

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

(1) alcohol

(3) natural gas

(2) benzene

(4) petroleum

82. Which statement explains why the element carbon forms so many compounds?

(1) Carbon atoms combine readily with oxygen.

(2) Carbon atoms have very high electronegativity.

(3) Carbon readily forms ionic bonds with other carbon atoms.

(4) Carbon readily forms covalent bonds with other carbon atoms.

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

(1) lithium

(3) fluorine

(2) oxygen

(4) carbon

84. The four single bonds of a carbon atom are directed in space toward the corners of a

(1) regular tetrahedron

(3) square plane

(2) regular octahedron

(4) trigonal bipyramid

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

(1)  $C_2H_6$

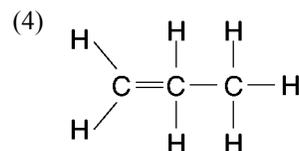
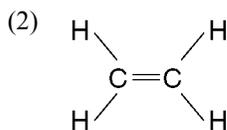
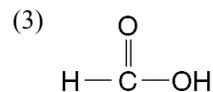
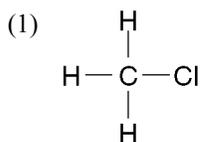
(3)  $C_4H_{10}$

(2)  $C_3H_8$

(4)  $C_5H_{12}$

86. What is the total number of pairs of electrons that one carbon atom shares with the other carbon atom in the molecule  $C_2H_4$ ?
- (1) 1 (3) 3  
(2) 2 (4) 4
87. A general characteristic of organic compounds is that they all
- (1) react vigorously  
(2) dissolve in water  
(3) are strong electrolytes  
(4) melt at relatively low temperatures
88. A compound that is classified as organic must contain the element
- (1) carbon (3) oxygen  
(2) nitrogen (4) hydrogen
89. Which of the following hydrocarbons has the lowest normal boiling point?
- (1) ethane (3) butane  
(2) propane (4) pentane
90. Which kind of bond is most common in organic compounds?
- (1) covalent (3) hydrogen  
(2) ionic (4) electrovalent
91. Which is a characteristic of most organic compounds?
- (1) They have very strong intermolecular forces.  
(2) They are primarily ionic in character.  
(3) They generally have low melting and boiling points.  
(4) They are all highly soluble in water.
92. Which representation is the structural formula of an organic compound?
- (1)  $CH_4$  (3)  $\begin{array}{c} H \\ | \\ H-C-H \\ | \\ H \end{array}$
- (2)  $NH_3$  (4)  $\begin{array}{c} H-N-H \\ | \\ H \end{array}$
93. In general, which property do organic compounds share?
- (1) high melting point  
(2) high electrical conductivity  
(3) readily soluble in water  
(4) slow reaction rate

94. Which structural formula is *incorrect*?



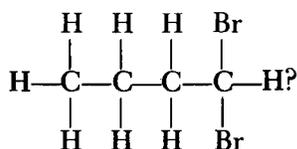
95. Given the structural formulas for two organic compounds:



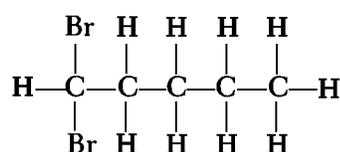
The differences in their physical and chemical properties are primarily due to their different

- (1) number of carbon atoms      (2) number of hydrogen atoms      (3) molecular masses      (4) functional groups

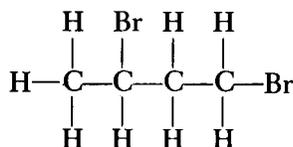
96. Which structural formula represents a compound that is an isomer of



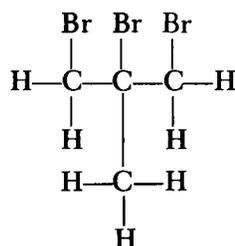
(1)



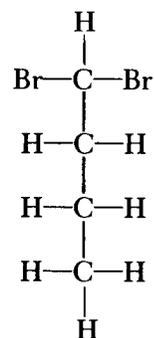
(2)



(3)



(4)



97. The compounds  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$  and  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$  are

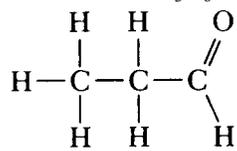
- (1) hydrocarbons      (2) allotropes      (3) isomers      (4) carbohydrates

98. What is the total number of pairs of electrons represented by dashes (–) in the structural formula  $\text{H}-\text{C}\equiv\text{C}-\text{H}$ ?

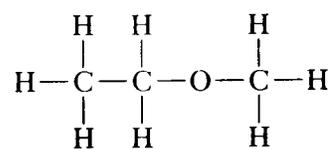
- (1) 10      (2) 8      (3) 5      (4) 4

99. Which structural formula represents a molecule with the empirical formula  $\text{C}_3\text{H}_6\text{O}$ ?

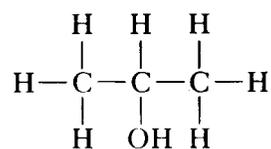
(1)



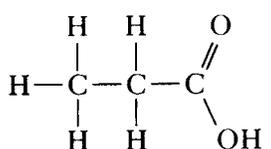
(2)



(3)



(4)



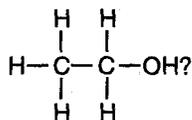
100. The four single bonds of a carbon atom are spatially directed toward the corners of a regular

- (1) triangle      (2) rectangle      (3) square      (4) tetrahedron

101. Which is an isomer of the compound propanoic acid,  $\text{CH}_3\text{CH}_2\text{COOH}$ ?

- (1)  $\text{CH}_2=\text{CHCOOH}$       (2)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$       (3)  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{OH}$       (4)  $\text{HCOOCH}_2\text{CH}_3$

102. Which is an isomer of



- (1)  $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H}-\text{C}-\text{O}-\text{C}-\text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$       (3)  $\begin{array}{c} \text{H} \quad \text{O} \\ | \quad || \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | \\ \text{H} \end{array}$
- (2)  $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{HO}-\text{C}-\text{C}-\text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$       (4)  $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{C}-\text{H} \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$

103.

The functional group  $\begin{array}{c} \text{O} \\ || \\ \text{C} \\ | \\ \text{OH} \end{array}$  is always found in an organic

- (1) acid                                      (3) ether  
 (2) ester                                    (4) aldehyde
104. Which formula represents ethanoic acid?  
 (1)  $\text{CH}_3\text{OCH}_3$                               (3)  $\text{HCOOCH}_3$   
 (2)  $\text{CH}_3\text{CH}_2\text{OH}$                             (4)  $\text{CH}_3\text{COOH}$
105. Which structural formula represents an organic acid?  
 (1)  $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$       (3)  $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H}-\text{C}-\text{C}-\text{C} \\ | \quad | \quad || \\ \text{H} \quad \text{H} \quad \text{O} \\ \quad \quad \quad | \\ \quad \quad \quad \text{OH} \end{array}$   
 (2)  $\begin{array}{c} \text{H} \quad \text{OH} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$       (4)  $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{HO}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$

106. Which is the correct structural formula for glycerol?

- (1)  $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$       (3)  $\begin{array}{c} \text{OH} \\ | \\ \text{HO}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$
- (2)  $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$       (4)  $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$

107. Which structural formula represents 2-propanol?

- (1)  $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$       (3)  $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ | \quad | \quad | \\ \text{OH} \quad \text{OH} \quad \text{H} \end{array}$
- (2)  $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ | \quad | \quad | \\ \text{OH} \quad \text{H} \quad \text{OH} \end{array}$       (4)  $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ | \quad | \quad | \\ \text{H} \quad \text{OH} \quad \text{H} \end{array}$

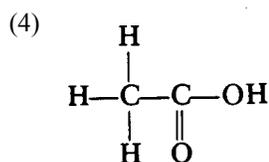
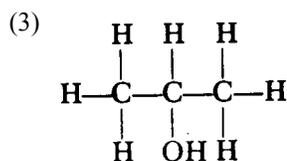
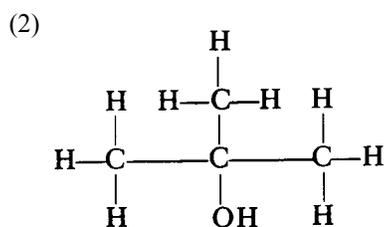
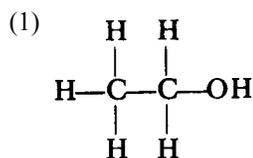
108. Which structural formula represents a dihydroxy alcohol?

- (1)  $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H}-\text{C}-\text{C}-\text{OH} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$       (3)  $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$
- (2)  $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$       (4)  $\begin{array}{c} \text{OH} \\ | \\ \text{C} \\ / \quad \backslash \\ \text{H}-\text{C} \quad \text{C}-\text{H} \\ | \quad | \\ \text{H}-\text{C} \quad \text{C}-\text{H} \\ \backslash \quad / \\ \text{C} \\ | \\ \text{H} \end{array}$

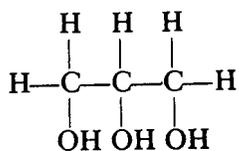
109. When the name of an alcohol is derived from the corresponding alkane, the final "-e" of the name of the alkane should be replaced by the suffix

- (1) "-al" (3) "-one"  
 (2) "-ol" (4) "-ole"

110. Which structural formula represents a secondary alcohol?



111. Which compound has the formula shown below?

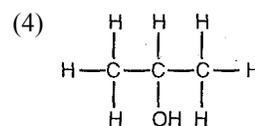
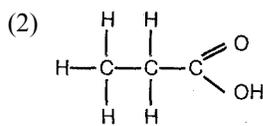
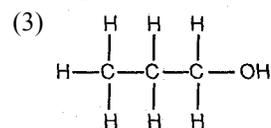
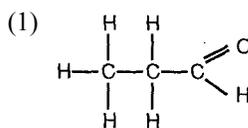


- (1) ethylene glycol (3) 1,2-ethanediol  
 (2) propylene glycol (4) 1,2,3-propanetriol

112. In the primary alcohol propanol, the -OH group is bonded to

- (1) an end carbon atom in the carbon chain  
 (2) a central carbon atom in the carbon chain  
 (3) a carbon atom that is bonded to only one hydrogen atom  
 (4) a carbon atom that is bonded to no hydrogen atoms

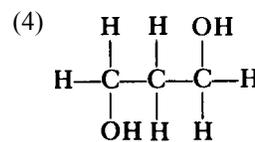
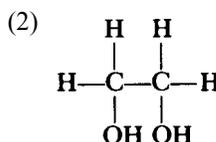
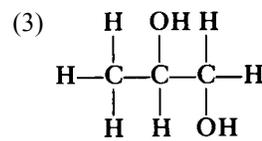
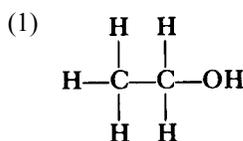
113. Which structural formula represents a primary alcohol?



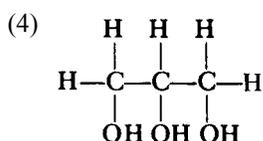
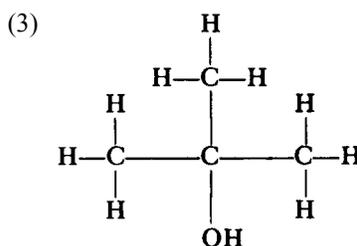
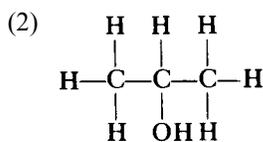
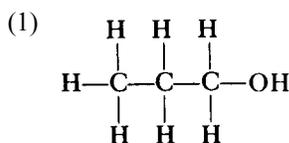
114. Which compounds are isomers?

- (1) 1-propanol and 2-propanol  
 (2) methanoic acid and ethanoic acid  
 (3) methanol and methanal  
 (4) ethane and ethanol

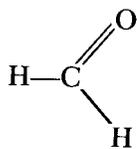
115. Which is the correct structural formula for 1,2-ethanediol?



116. Which is a tertiary alcohol?

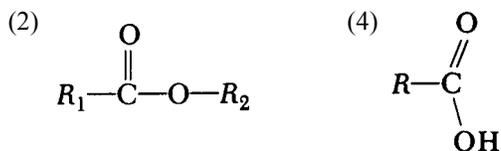


117.



Which is represented by the structural formula above?

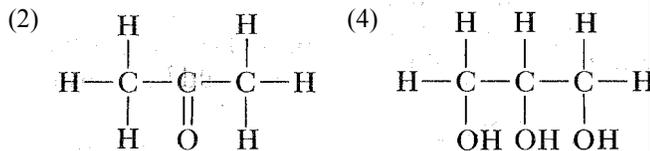
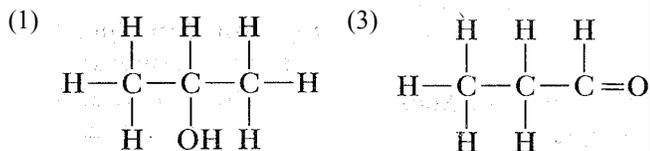
- (1) an aldehyde (2) an alcohol (3) an alkane (4) an acid
118. Which is the common name for the organic compound whose IUPAC name is methanal?
- (1) formaldehyde (2) acetaldehyde (3) formic acid (4) acetic acid
119. Which general formula represents a ketone?



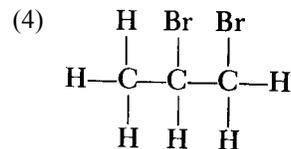
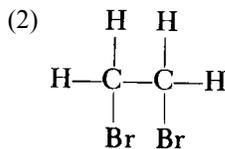
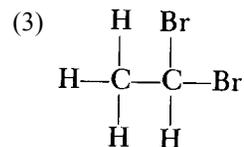
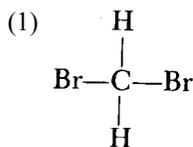
120. Which formula represents a ketone?

- (1)  $\text{CH}_3\text{COCH}_3$  (2)  $\text{C}_2\text{H}_5\text{COOCH}_3$  (3)  $\text{C}_2\text{H}_5\text{COOH}$  (4)  $\text{CH}_3\text{CHO}$

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



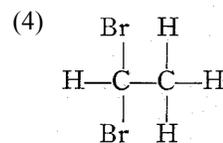
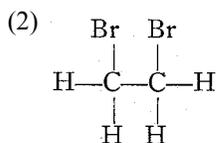
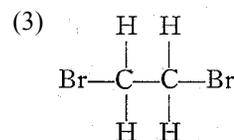
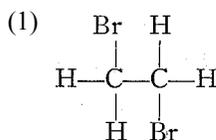
122. Which is the structure for 1,2-dibromoethane?



123. Which is an isomer of 2-chloropropane?

- (1) butane (2) propane (3) 1-chlorobutane (4) 1-chloropropane

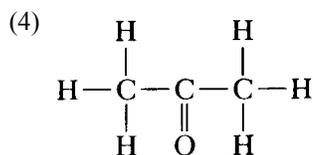
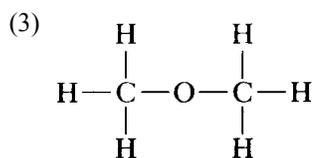
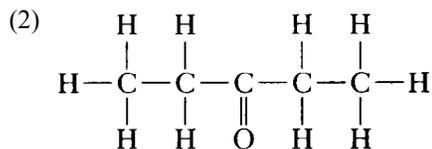
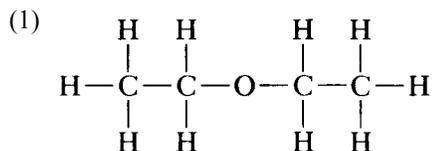
124. What is the correct formula of 1,1-dibromoethane?



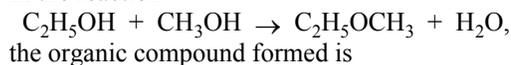
125. Which compound is an ester?

- (1)  $\text{CH}_3\text{OH}$  (2)  $\text{CH}_3\text{COOH}$  (3)  $\text{CH}_3\text{OCH}_3$  (4)  $\text{CH}_3\text{COOCH}_3$

126. Which is the structural formula for diethyl ether?



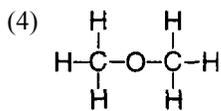
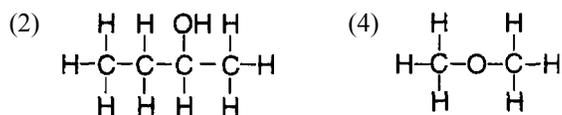
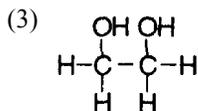
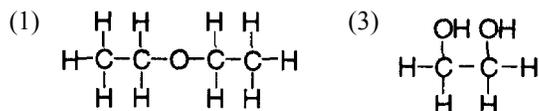
127. In the reaction



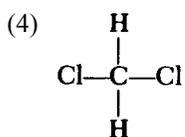
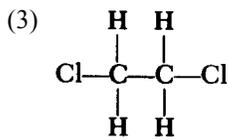
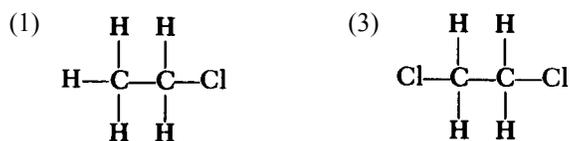
the organic compound formed is

- (1) an aldehyde (3) an acid  
(2) a ketone (4) an ether

128. Which structural formula represents diethyl ether?



129. Which is the product of the reaction between ethene and chlorine?



130. The reaction  $\text{CH}_4 + \text{Br}_2 \rightarrow \text{CH}_3\text{Br} + \text{HBr}$  is an example of

- (1) addition (3) substitution  
(2) hydrogenation (4) polymerization

131. Which organic reaction involves the bonding of monomers by a dehydration process?

- (1) substitution  
(2) oxidation  
(3) addition polymerization  
(4) condensation polymerization

132. The process of opening double bonds and joining monomer molecules to form polyvinyl chloride is called

- (1) addition polymerization  
(2) condensation polymerization  
(3) dehydration polymerization  
(4) neutralization polymerization

133. One of the products of condensation polymerization is

- (1) water (3) a monomer  
(2) an acid (4) a ketone

134. The formation of large molecules from small molecules is an example of

- (1) polymerization (3) saponification  
(2) decomposition (4) substitution

135. Which polymers occur naturally?

- (1) starch and nylon (3) protein and nylon  
(2) starch and cellulose (4) protein and plastic

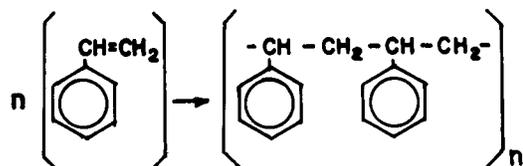
136. Cellulose is an example of

- (1) a synthetic polymer (3) an ester  
(2) a natural polymer (4) a ketone

137. Which reaction is used to produce polyethylene ( $\text{C}_2\text{H}_4$ )<sub>n</sub> from ethylene?

- (1) addition polymerization  
(2) substitution  
(3) condensation polymerization  
(4) reduction

138. Which process is represented by the following diagram?



- (1) polymerization (3) combustion  
(2) saponification (4) hydrolysis

139. When  $C_2H_4$  molecules polymerize, the name of the polymer formed is

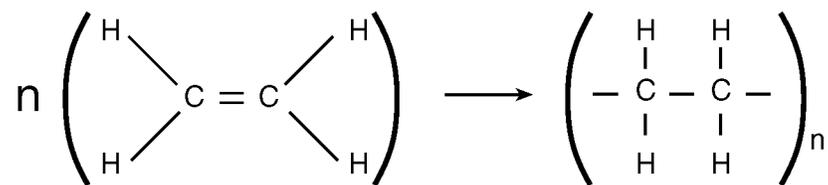
- (1) polymethylene (3) polypropylene  
 (2) polyethylene (4) polybutylene

140. A condensation polymerization reaction is best described as the

- (1) joining of monomers by the removal of oxygen  
 (2) joining of monomers by the removal of water  
 (3) oxidation of a hydrocarbon by oxygen  
 (4) oxidation of a hydrocarbon by water

141. Which type of reaction is represented by the equation below?

**Note:**  $n$  and  $n$  are very large numbers equal to about 2000.



- (1) esterification (2) fermentation (3) saponification (4) polymerization

142. The reaction of an alcohol with an organic acid produces a compound classified as

- (1) a soap (3) an ester  
 (2) a salt (4) a base

143. Which equation represents an esterification reaction?

- (1)  $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$   
 (2)  $C_5H_{10} + H_2 \rightarrow C_5H_{12}$   
 (3)  $C_3H_8 + Cl_2 \rightarrow C_3H_7Cl + HCl$   
 (4)  $HCOOH + CH_3OH \rightarrow HCOOCH_3 + HOH$

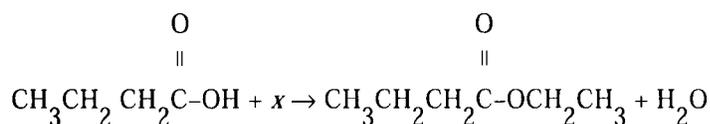
144. Which compound will react with  $CH_3COOH$  to form the ester methyl ethanoate?

- (1)  $CH_3OCH_3$  (3)  $CH_3OH$   
 (2)  $CH_3COCH_3$  (4)  $CH_3COOH$

145. Which alcohol reacts with  $C_2H_5COOH$  to produce the ester  $C_2H_5COOC_2H_5$ ?

- (1)  $CH_3OH$  (3)  $C_3H_7OH$   
 (2)  $C_2H_5OH$  (4)  $C_4H_9OH$

146. Given the incomplete reaction:



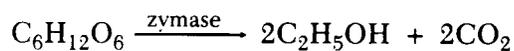
Which compound is represented by  $x$ ?

- (1)  $CH_3CH_2OH$  (3)  $\begin{array}{c} \text{O} \\ || \\ CH_3OCH_2CH_3 \end{array}$   
 (2)  $CH_3C-H$  (4)  $\begin{array}{c} \text{O} \\ || \\ CH_3CCH_3 \end{array}$

147. Which substances are products of a fermentation reaction?

- (1) water and carbon dioxide (3) alcohol and carbon dioxide  
 (2) soap and glycerol (4) ester and water

148. Which type of reaction is represented by the equation below?



- (1) saponification                      (3) esterification  
(2) polymerization                      (4) fermentation

149. Which equation represents fermentation?

- (1)  $\text{C}_2\text{H}_6 + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_6\text{Cl} + \text{HCl}$   
(2)  $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$   
(3)  $\text{CH}_3\text{COOH} + \text{CH}_3\text{OH} \rightarrow \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$   
(4)  $n\text{C}_2\text{H}_4 \rightarrow (\text{C}_2\text{H}_4)_n$

150. When  $\text{C}_3\text{H}_8$  burns completely in an excess of oxygen, the products formed are

- (1) CO and  $\text{H}_2\text{O}$                       (3) CO and  $\text{H}_2$   
(2)  $\text{CO}_2$  and  $\text{H}_2\text{O}$                       (4)  $\text{CO}_2$  and  $\text{H}_2$

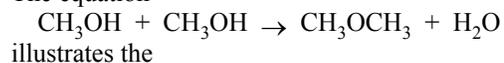
151. The hydrolysis of a fat by a base is called

- (1) saponification                      (3) polymerization  
(2) esterification                      (4) neutralization

152. Which is produced by the dehydration of primary alcohols?

- (1) an acid                                  (3) an ether  
(2) a ketone                                (4) an ester

153. The equation



- (1) oxidation of alcohols to form a ketone  
(2) oxidation of alcohols to form an acid  
(3) dehydration of alcohols to form a polymer  
(4) dehydration of alcohols to form an ether

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**Answer Key**

1. 4
2. 4
3. 1
4. 4
5. 1
6. 3
7. 2
8. 1
9. 1
10. 3
11. 2
12. 1
13. 2
14. 2
15. 2
16. 1
17. 4
18. 3
19. 1
20. 4
21. 1
22. 4
23. 2
24. 1
25. 2
26. 1
27. 2
28. 1
29. 2
30. 1

31. 3
  32. 3
  33. 3
  34. 1
  35. 2
  36. 1
  37. 4
  38. 4
  39. 1
  40. 4
  41. 1
  42. 3
  43. 3
  44. 1
  45. 4
  46. 4
  47. 2
  48. 4
  49. 2
  50. 1
  51. 1
  52. 4
  53. 2
  54. 1
  55. 2
  56. 4
  57. 4
  58. 3
  59. 1
  60. 3
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**Answer Key**

- 61.   4
- 62.   2
- 63.   4
- 64.   3
- 65.   2
- 66.   2
- 67.   2
- 68.   2
- 69.   1
- 70.   3
- 71.   4
- 72.   2
- 73.   2
- 74.   3
- 75.   3
- 76.   2
- 77.   4
- 78.   4
- 79.   2
- 80.   2
- 81.   4
- 82.   4
- 83.   4
- 84.   1
- 85.   4
- 86.   2
- 87.   4
- 88.   1
- 89.   1
- 90.   1

- 91.   3
  - 92.   3
  - 93.   4
  - 94.   4
  - 95.   4
  - 96.   2
  - 97.   3
  - 98.   3
  - 99.   1
  - 100.   4
  - 101.   4
  - 102.   1
  - 103.   1
  - 104.   4
  - 105.   3
  - 106.   4
  - 107.   4
  - 108.   3
  - 109.   2
  - 110.   3
  - 111.   4
  - 112.   1
  - 113.   3
  - 114.   1
  - 115.   2
  - 116.   3
  - 117.   1
  - 118.   1
  - 119.   1
  - 120.   1
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**Answer Key**

121.   2    
122.   2    
123.   4    
124.   4    
125.   4    
126.   1    
127.   4    
128.   1    
129.   3    
130.   3    
131.   4    
132.   1    
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134.   1    
135.   2    
136.   2    
137.   1    
138.   1    
139.   2    
140.   2    
141.   4    
142.   3    
143.   4    
144.   3    
145.   2    
146.   1    
147.   3    
148.   4    
149.   2    
150.   2

151.   1    
152.   3    
153.   4
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