

Chapter 11 - Alkanes

1. Alkanes belong to which class of hydrocarbons?

- a. alkali
- b. aromatic
- c. saturated
- d. unsaturated

ANSWER: c

POINTS: 1

TOPICS: 11.1 - WHAT ARE ALKANES?

2. Which of the following explains why alkanes are called saturated hydrocarbons?

- a. They are good solvents for most organic compounds.
- b. They are the most highly reactive organic compounds.
- c. They contain the maximum possible number of hydrogen atoms bonded to each carbon.
- d. They are found in animal fats and plant oils.

ANSWER: c

POINTS: 1

TOPICS: 11.1 - WHAT ARE ALKANES?

3. Compounds which contain only carbon-carbon single bonds are classified as which of the following?

- a. alkanes
- b. alkenes
- c. alkynes
- d. arenes

ANSWER: a

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

4. Compounds which contain a carbon-carbon double bond are classified as which of the following?

- a. alkanes
- b. alkenes
- c. alkynes
- d. arenes

ANSWER: b

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

5. Compounds which contain a carbon-carbon triple bond are classified as which of the following?

- a. alkanes
- b. alkenes
- c. alkynes
- d. arenes

ANSWER: c

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

6. Compounds which contain one or more benzene-like rings are classified as which of the following?

- a. alkanes
- b. alkenes
- c. alkynes
- d. arenes

ANSWER: d

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

7. What is the name given to a $-\text{CH}_2-$ group?

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- a. methane b. methylane
c. methylene d. methyl

ANSWER: c

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

8. Unbranched hydrocarbons are also called straight chain hydrocarbons. Which of the following is true of unbranched hydrocarbons?

- a. The C–C–C angle is 180° .
b. No carbon atom is connected to more than two other carbon atoms.
c. both a and b
d. neither a nor b

ANSWER: b

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

9. Unbranched hydrocarbons are also called straight chain hydrocarbons. Which of the following is true of unbranched hydrocarbons?

- a. Each carbon has bond angles of 120° .
b. Every carbon atom is connected to two other carbon atoms.
c. both a and b
d. neither a nor b

ANSWER: d

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

10. Which of the following is the correct molecular formula for hexane?

- a. C_6H_6 b. C_6H_{10}
c. C_6H_{14} d. C_6H_{16}

ANSWER: c

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

11. Which of the following is the correct molecular formula for heptane?

- a. C_5H_{12} b. C_6H_{14}
c. C_7H_{16} d. C_8H_{18}

ANSWER: c

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

12. Which of the following is the correct molecular formula for nonane?

- a. C_7H_{16} b. C_9H_{20}
c. $C_{11}H_{24}$ d. none of these

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ANSWER: b

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

13. Of the hydrocarbons given here, which contains the most carbon atoms?

- a. butane b. pentane
- c. ethane d. propane

ANSWER: b

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

14. Dodecane is a 12 carbon alkane. How many hydrogen atoms are in dodecane?

- a. 12 b. 24
- c. 26 d. 28

ANSWER: c

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

15. Eicosane is a 20 carbon alkane. How many hydrogen atoms are in eicosane?

- a. 38 b. 40
- c. 42 d. 44

ANSWER: c

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

16. Which of the following represents the molecular formula for an unbranched alkane?

- a. C_5H_{10} b. C_6H_{10}
- c. C_7H_{18} d. C_8H_{18}

ANSWER: d

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

17. Which of the following is not the molecular formula of a noncyclic alkane?

- a. $C_{15}H_{32}$ b. $C_{19}H_{38}$
- c. $C_{20}H_{42}$ d. $C_{22}H_{46}$

ANSWER: b

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

18. Which of the following represents the molecular formula for a noncyclic alkane?

- a. $C_{15}H_{30}$ b. $C_{19}H_{40}$
- c. $C_{20}H_{40}$ d. all of them

ANSWER: b

POINTS: 1

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TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

19. Which of the following is not the molecular formula of an alkane?

- a. $C_{15}H_{32}$ b. $C_{19}H_{40}$
c. $C_{20}H_{42}$ d. None of them, these are all alkanes.

ANSWER: d

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

20. Which of the following correctly describes the relationship between butane and 2-methylpropane?

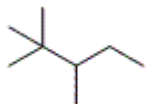
- a. They have the same molecular formula.
b. They have the same chemical properties.
c. They have the same physical properties.
d. All of the above are true.

ANSWER: a

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

21. What is the molecular formula for the following compound?



- a. C_7H_{16} b. C_8H_{16}
c. C_8H_{17} d. C_8H_{18}

ANSWER: d

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

22. Which of the following compounds are constitutional isomers?



- a. (i) and (ii) b. (i) and (iii)
c. (ii) and (iii) d. all of them

ANSWER: d

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

23. The formula of a particular compound can be written as

- (i) C_4H_{10}
(ii) $CH_3CH_2CH_2CH_3$
(iii) $CH_3(CH_2)_2CH_3$

Which of the following is true?

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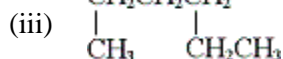
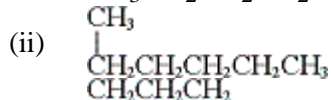
- All of these provide exactly the same amount of information.
- Formula (ii) provides more information than formulas (i) or (iii).
- Formulas (ii) and (iii) provide exactly the same amount of information.
- No two of these provide exactly the same amount of information.

ANSWER: c

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

24. Which of the following are representations of the same molecule?



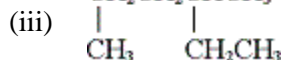
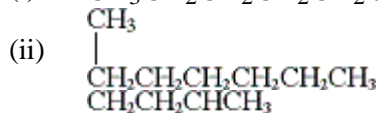
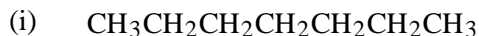
- only (i) and (ii)
- only (i) and (iii)
- only (ii) and (iii)
- all of them

ANSWER: d

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

25. Which of the following are representations of the same molecule?



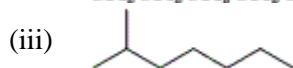
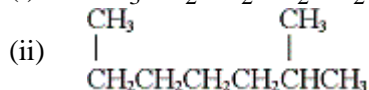
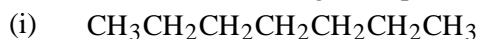
- only (i) and (ii)
- only (i) and (iii)
- only (ii) and (iii)
- none of them

ANSWER: a

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

26. Which of the following are representations of the same molecule?



- only (i) and (ii)
- only (i) and (iii)
- only (ii) and (iii)
- none of them

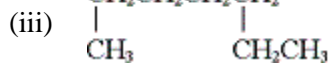
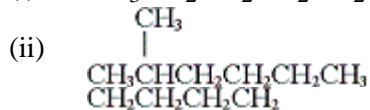
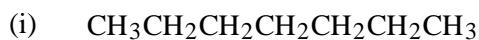
ANSWER: c

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

27. Which of the following are representations of the same molecule?

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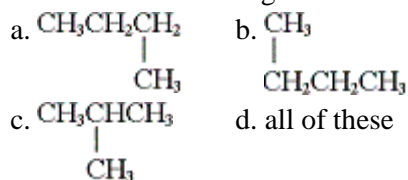
- a. only (i) and (ii) b. only (i) and (iii)
c. only (ii) and (iii) d. none of them

ANSWER: b

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

28. Which of the following is a constitutional isomer of butane, $\text{CH}_3(\text{CH}_2)_2\text{CH}_3$?

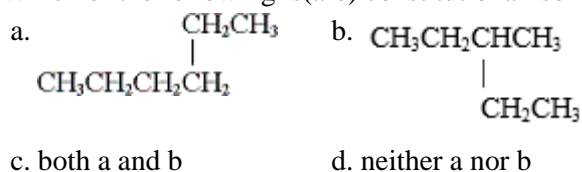


ANSWER: c

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

29. Which of the following is(are) constitutional isomer(s) of hexane, $\text{CH}_3(\text{CH}_2)_4\text{CH}_3$?

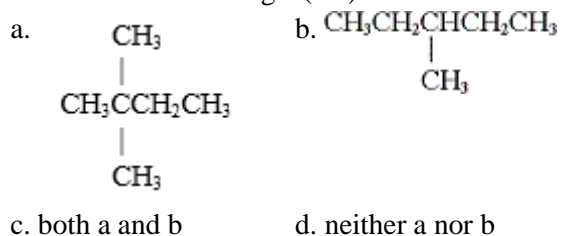


ANSWER: b

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

30. Which of the following is(are) constitutional isomer(s) of hexane, $\text{CH}_2(\text{CH}_2)_4\text{CH}_3$?



ANSWER: b

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

31. How many constitutional isomers are there with the formula C_6H_{14} ?

- a. 4 b. 5
c. 6 d. 7

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ANSWER: b

POINTS: 1

TOPICS: 11.3 - WHAT ARE CONSTITUTIONAL ISOMERS

32. When naming a branching substituent in an alkane, which of the following is the correct procedure?
- Add the suffix -yl to the name of the parent hydrocarbon.
 - Replace the suffix -ane with the suffix -yl.
 - Replace the suffix -ane with the suffix -anyl.
 - Insert -yl before the suffix -ane.

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

33. Which of the following is true of branched chain hydrocarbons?
- The longest carbon chain becomes the root name
 - The longest carbon chain is always written horizontally
 - both a and b
 - neither a nor b

ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

34. Given the compounds 2,3-dimethylpentane, 3-ethylpentane and 3-methylhexane, which are constitutional isomers of one another?
- only 2,3-dimethylpentane and 3-ethylpentane
 - only 2,3-dimethylpentane and 3-methylhexane
 - only 3-ethylpentane and 3-methylhexane
 - They are all constitutional isomers of one another.

ANSWER: d

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

35. Of the compounds listed here, which one is not a constitutional isomer of the other three?
- 2,3-dimethylpentane
 - 3-methylhexane
 - 3-ethylpentane
 - 2,2-dimethylbutane

ANSWER: d

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

36. How many different substituent groups can be obtained by removing a hydrogen atom from ethane?
- 1
 - 2
 - 3
 - 4

ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

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37. How many different substituent groups can be obtained by removing a hydrogen atom from propane?

- a. 1
- b. 2
- c. 3
- d. 4

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

38. How many different substituent groups can be obtained by removing a hydrogen atom from butane?

- a. 1
- b. 2
- c. 3
- d. 4

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

39. The butyl group is obtained by doing which of the following?

- a. removing a hydrogen atom from C-1 of butane
- b. removing a hydrogen atom from C-2 of butane
- c. removing a hydrogen atom from C-1 of 2-methylpropane
- d. removing a hydrogen atom from C-2 of 2-methylpropane

ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

40. The isobutyl group is obtained by doing which of the following?

- a. removing a hydrogen atom from C-1 of butane
- b. removing a hydrogen atom from C-2 of butane
- c. removing a hydrogen atom from C-1 of 2-methylpropane
- d. removing a hydrogen atom from C-2 of 2-methylpropane

ANSWER: c

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

41. The *sec*-butyl group is obtained by doing which of the following?

- a. removing a hydrogen atom from C-1 of butane
- b. removing a hydrogen atom from C-2 of butane
- c. removing a hydrogen atom from C-1 of 2-methylpropane
- d. removing a hydrogen atom from C-2 of 2-methylpropane

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

42. The *tert*-butyl group is obtained by doing which of the following?

- a. removing a hydrogen atom from C-1 of butane
- b. removing a hydrogen atom from C-2 of butane

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- c. removing a hydrogen atom from C-1 of 2-methylpropane
- d. removing a hydrogen atom from C-2 of 2-methylpropane

ANSWER: d

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

43. When deriving an IUPAC name, which of the following prefixes should be ignored during the alphabetizing of substituents?

- a. di- b. *sec*-
- c. tri- d. all of these

ANSWER: d

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

44. When deriving an IUPAC name, which of the following prefixes should not be ignored during the alphabetizing of substituents?

- a. iso b. di-
- c. *sec*- d. All three should be ignored.

ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

45. Which of the following is a correct IUPAC name?

- a. 1-methylhexane b. 2-ethylhexane
- c. 3-propylhexane d. None, they are all incorrect.

ANSWER: d

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

46. Which of the following is a correct IUPAC name?

- a. 1-methylpentane b. 2-ethylpentane
- c. 3-ethylpentane d. None, they are all incorrect.

ANSWER: c

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

47. Which of the following is a correct IUPAC name?

- a. 2-ethylpropane b. 2-ethylbutane
- c. 2-ethylpentane d. None, they are all incorrect.

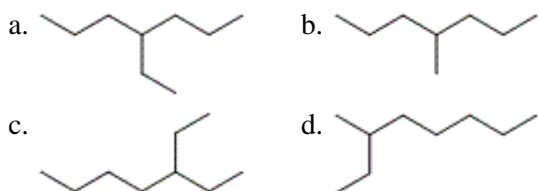
ANSWER: d

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

48. Which of the following is the correct line-angle structure for 3-ethylheptane?

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ANSWER: c

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

49. What is the correct IUPAC name for the following compound?



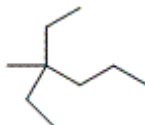
- a. 1,1-dimethylpentane b. 2,2-dimethylpentane
c. 1,1,1-trimethylbutane d. 4,4,4-trimethylbutane

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

50. Which is the correct IUPAC name for the following compound?



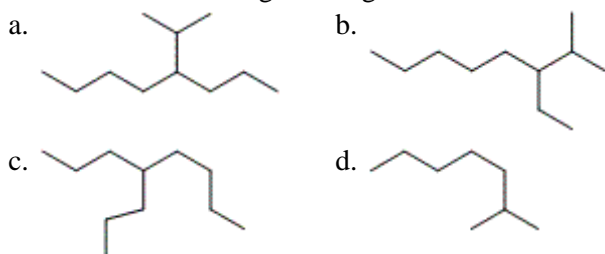
- a. 2,2-diethylpentane b. 4-ethyl-4-methylhexane
c. 4-methyl-4-ethylhexane d. 3-ethyl-3-methylhexane

ANSWER: d

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

51. Which of the following line-angle structures is 4-isopropyloctane?

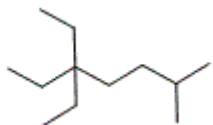


ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

52. What is the correct IUPAC name for the following compound?



- a. 3,3-diethyl-6-methylheptane b. isododecane

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- c. 5,5-diethyl-2-methylheptane d. 1,1,1-triethyl-4-methylpentane

ANSWER: c

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

53. What is the common name of 2-methylbutane?

- a. isopentane b. neopentane
c. 2-methylisopropane d. none of these

ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

54. Pentane and 2-methylbutane have third isomer, neopentane. What is the IUPAC name of this isomer?

- a. 2,2-dimethylpropane b. 2-methylisobutane
c. 2-ethylpropane d. none of these

ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

55. On an exam, students were shown the structure of an alkane and asked to give the IUPAC name of the compound. Of the following answers which were given, which corresponds to the correct IUPAC name of a real compound?

- a. 2-ethyl-2-methylbutane b. 2,2-dimethylbutane
c. 2,2-diethylbutane d. none of them

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

56. Which of the following is a correct IUPAC name?

- a. 2-ethyl-3-methylpentane b. 2,2-dimethylpentane
c. 2,2-diethylpentane d. all of them

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

57. A student gave the name of a compound as 2-methyl-2-ethylbutane. Although this correctly represented the connectivity of the compound, it was not a valid IUPAC name. What is the correct IUPAC name for this compound?

- a. 2-ethyl-2-methylbutane b. 2,2-dimethylpentane
c. 2,2-diethylpropane d. none of these

ANSWER: d

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

58. A student gave the name of a compound as 2,2-diethylpentane. Although this correctly represented the connectivity of the compound, it was not a valid IUPAC name. What is the correct IUPAC name for this compound?

- a. 3-ethyl-3-methylhexane b. 3-methyl-3-propylpentane
c. 2-ethyl-2-propylbutane d. 4,4-diethylpentane

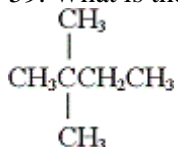
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ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

59. What is the IUPAC name of the compound below?



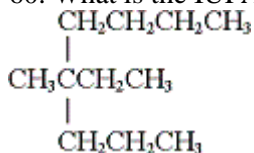
- a. 2-ethyl-2-methylpropane b. 2,2-dimethylbutane
c. 3,3-dimethylbutane d. none of these

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

60. What is the IUPAC name of the compound below?



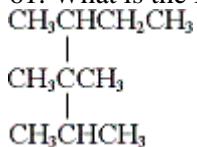
- a. 4-ethyl-4-methyloctane b. 3-methyl-3-propylheptane
c. 2-ethyl-2-propylhexane d. none of these

ANSWER: a

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

61. What is the IUPAC name of the compound below?



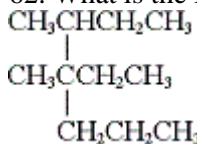
- a. 2-isopropyl-2,3-dimethylpentane b. 2-sec-butyl-2-isopropylpropane
c. 2,3,3,4-tetramethylhexane d. none of these

ANSWER: c

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

62. What is the IUPAC name of the compound below?



- a. 2-sec-butyl-2-propylbutane b. 4-ethyl-3,4-dimethylheptane
c. 3,4-dimethyl-3-propylhexane d. none of these

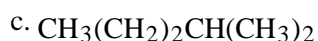
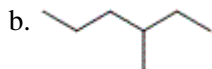
ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

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63. Which of the following compounds has the common name isohexane?



d. none of these

ANSWER: c

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

64. What is the most abundant alkane present in natural gas?

a. butane b. propane

c. ethane d. methane

ANSWER: d

POINTS: 1

TOPICS: 11.5 - WHERE DO WE OBTAIN ALKANES?

65. Which size rings of carbon atoms are especially abundant in nature?

a. 3 and 4 carbon atom rings b. 4 and 5 carbon atom rings

c. 5 and 6 carbon atom rings d. 6 and 7 carbon atom rings

ANSWER: c

POINTS: 1

TOPICS: 11.6 - WHAT ARE CYCLOALKANES?

66. When organic chemists draw the structure of a cycloalkane, which of the following do they most frequently write?

a. all the C and H atoms

b. only the C atoms

c. only the polygon with as many sides as there are carbon atoms

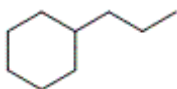
d. the appropriate polygon and all the C and H atoms

ANSWER: c

POINTS: 1

TOPICS: 11.6 - WHAT ARE CYCLOALKANES?

67. What is the IUPAC name of the following compound?



a. 1-propylcyclohexane b. isopropylcyclohexane

c. 1-propylhexane d. propylcyclohexane

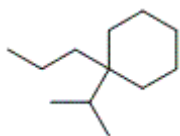
ANSWER: d

POINTS: 1

TOPICS: 11.6 - WHAT ARE CYCLOALKANES?

68. What is the IUPAC name of the following compound?

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- a. 1,1-dipropylcyclohexane b. 1-isopropyl-1-propylcyclohexane
c. isopropylpropylcyclohexane d. none of these

ANSWER: b

POINTS: 1

TOPICS: 11.6 - WHAT ARE CYCLOALKANES?

69. What is the IUPAC name of the following compound?



- a. diethylcyclopentane b. butylcyclopentane
c. 1,1-diethylcyclopentane d. none of these

ANSWER: c

POINTS: 1

TOPICS: 11.6 - WHAT ARE CYCLOALKANES?

70. How many cycloalkanes have the molecular formula C_5H_{10} ?

- a. 3 b. 4
c. 5 d. 6

ANSWER: c

POINTS: 1

TOPICS: 11.6 - WHAT ARE CYCLOALKANES?

71. Different conformations of an alkane are the result of which of the following?

- a. rotation around C–H bonds b. rotation around C–C bonds
c. the existence of cyclic compounds d. all of the these

ANSWER: b

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

72. Which of the following is true about conformations of cycloalkanes?

- a. They are constitutional isomers of one another.
b. They are obtained from one another by rotation around carbon-carbon bonds.
c. They are obtained from one another by breaking and reforming carbon-carbon bonds.
d. They are equally stable.

ANSWER: b

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

73. Which of the following is the most stable conformation of cyclopentane?

- a. boat b. chair
c. envelope d. twist

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ANSWER: c

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

74. Which of the following is the most stable conformation of cyclohexane?

- a. boat
- b. chair
- c. envelope
- d. twist

ANSWER: b

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

75. Which of the following is true of the axial positions in cyclohexane?

- a. Each carbon atom of the ring has two groups bonded to it in axial positions.
- b. Each carbon atom of the ring has one group bonded to it in an axial position.
- c. The axial positions are all on the same side of the ring.
- d. The axial and equatorial positions on each carbon atom are on the same side of the ring.

ANSWER: b

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

76. Which of the following is true of the equatorial positions in cyclohexane?

- a. Each carbon atom of the ring has two groups bonded to it in equatorial positions.
- b. Each carbon atom of the ring has one group bonded to it in an equatorial position.
- c. The equatorial positions are all on the same side of the ring.
- d. The axial and equatorial positions on each carbon atom are on the same side of the ring.

ANSWER: b

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

77. Which of the following are perpendicular to the imaginary plane through the six carbon atoms of cyclohexane?

- a. only the axial bonds
- b. only the equatorial bonds
- c. both the axial and equatorial bonds
- d. neither the axial nor the equatorial bonds

ANSWER: a

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

78. Which of the following is true when there is a single substituent on cyclohexane?

- a. This substituent will prefer to be in the axial position.
- b. This substituent will prefer to be in the equatorial position.
- c. This substituent has no particular preference for either the axial or equatorial position.
- d. The situation will vary, depending on the identity of the substituent.

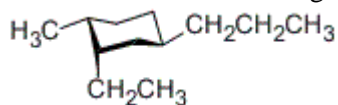
ANSWER: b

POINTS: 1

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TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

79. Which of the following statements about the conformation shown below are true?



- The ethyl and methyl groups are both axial.
- All three alkyl substituents are equatorial.
- The ethyl group is axial and the methyl group is equatorial.
- The ethyl and methyl groups are both equatorial and the propyl group is axial.

ANSWER: c

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

80. Which of the following is a correct IUPAC name?

- 1-methylcyclohexane
- cis*-1,3-dimethylcyclohexane
- cis*-1,1,2-trimethylcyclohexane
- trans*-1,1-diethylcyclobutane

ANSWER: b

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

81. Which of the following IUPAC names is incorrect?

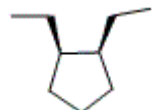
- methylcyclohexane
- cis*-1,4-dimethylcyclohexane
- cis*-1,1,2-trimethylcyclohexane
- none, they are all correct

ANSWER: c

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

82. What is the IUPAC name of the following compound?



- cis*-1,5-diethylcyclopentane
- trans*-1,2-diethylcyclopentane
- cis*-1,2-diethylcyclopentane
- trans*-1,5-diethylcyclopentane

ANSWER: c

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

83. Which of the following molecules can exist as *cis-trans* isomers?

- 1,1-dimethylcyclobutane
- 1,2-dimethylcyclobutane
- both a and b
- neither a nor b

ANSWER: b

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

84. Which of the following molecules can exist as *cis-trans* isomers?

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- a. 1,2-dimethylcyclobutane b. 1,3-dimethylcyclobutane
c. both a and b d. neither a nor b

ANSWER: c

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

85. Which of the following molecules can exist as *cis-trans* isomers?

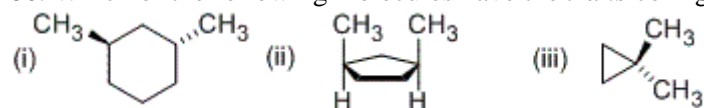
- a. 1-ethyl-2-methylcyclohexane b. 1-ethyl-1-methylcyclohexane
c. both a and b d. neither a nor b

ANSWER: a

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

86. Which of the following molecules have the *trans* configuration?



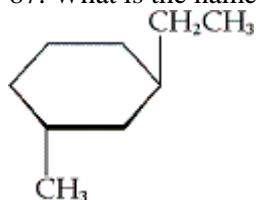
- a. (i) and (ii) b. (i) and (iii)
c. (ii) and (iii) d. only (i)

ANSWER: d

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

87. What is the name of the following compound?



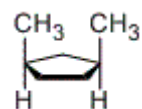
- a. *cis*-1-ethyl-3-methylcyclohexane b. *cis*-1-methyl-3-ethylcyclohexane
c. *trans*-1-ethyl-3-methylcyclohexane d. *trans*-1-methyl-3-ethylcyclohexane

ANSWER: c

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

88. What is the name of the following compound?



- a. *cis*-1,3-dimethylcyclopentane b. *cis*-1,4-dimethylcyclopentane
c. *trans*-1,3-dimethylcyclopentane d. *trans*-1,4-dimethylcyclopentane

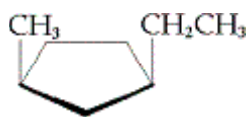
ANSWER: a

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

89. What is the name of the following compound?

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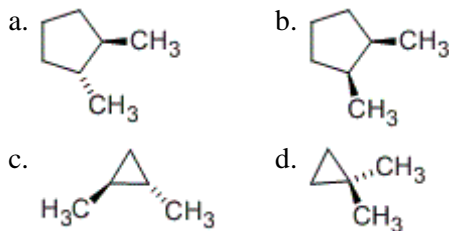
- a. *cis*-1-methyl-3-ethylcyclopentane b. *cis*-1-ethyl-3-methylcyclopentane
c. *trans*-1-methyl-3-ethylcyclopentane d. *trans*-1-ethyl-3-methylcyclopentane

ANSWER: b

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

90. What is the correct structure for *trans*-1,2-dimethylcyclopropane?



ANSWER: c

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

91. Based on a knowledge of the stability of the conformers of cyclohexane, which of the following statements is true about the isomers of 1,2-dimethylcyclohexane?

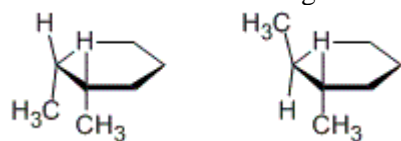
- a. The *cis*-isomer will have two equatorial methyl substituents in its most stable conformation.
b. The *trans*-isomer will have two axial methyl substituents in its most stable conformation.
c. The *trans*-isomer will have two equatorial methyl substituents in its most stable conformation.
d. The *cis*- and *trans*-isomers are equally stable.

ANSWER: c

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

92. How are the following two compounds related to each other?



- a. stereoisomers
b. constitutional isomers
c. different conformations of the same compound
d. none of the above

ANSWER: a

POINTS: 1

TOPICS: 11.8 - WHAT IS CIS-TRANS ISOMERISM IN CYCLOALKANES?

93. Which of the following has the highest boiling point?

- a. heptane b. hexane
c. octane d. nonane

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ANSWER: d

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

94. Which of the following has the lowest boiling point?

- a. heptane
- b. hexane
- c. octane
- d. nonane

ANSWER: b

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

95. Which of the following has the highest melting point?

- a. decane
- b. hexane
- c. octane
- d. nonane

ANSWER: a

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

96. Which of the following has the lowest melting point?

- a. decane
- b. hexane
- c. octane
- d. nonane

ANSWER: b

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

97. Which of the following is a liquid at room temperature and pressure?

- a. butane
- b. ethane
- c. propane
- d. none of them

ANSWER: d

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

98. Which of the following is a gas at room temperature and pressure?

- a. butane
- b. hexane
- c. pentane
- d. none of them

ANSWER: a

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

99. Which of the following straight chain alkanes is a solid at room temperature?

- a. $C_{10}H_{22}$
- b. C_6H_{14}
- c. $C_{27}H_{56}$
- d. none of them

ANSWER: c

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

Chapter 11 - Alkanes

100. Which of the following straight chain alkanes has a density greater than that of water?

- a. C_6H_{14}
- b. $C_{20}H_{42}$
- c. $C_{40}H_{82}$
- d. none of them

ANSWER: d

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

101. Which of the following is true of pentane and 2-methylbutane?

- a. They have the same molecular formula.
- b. They have the same boiling point.
- c. Both a and b are true.
- d. Neither a nor b is true.

ANSWER: a

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

102. Which of the following is true of heptane and 2,2,3-trimethylbutane?

- a. They have the same melting point
- b. They have the same boiling point.
- c. Both a and b are true.
- d. Neither a nor b is true.

ANSWER: d

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

103. Which isomer of pentane has the highest boiling point?

- a. pentane
- b. 2-methylbutane
- c. 2,2-dimethylpropane
- d. None, they all have the same boiling point.

ANSWER: a

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

104. Which isomer of pentane has the lowest boiling point?

- a. pentane
- b. 2-methylbutane
- c. 2,2-dimethylpropane
- d. None, they all have the same boiling point.

ANSWER: c

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

105. Which of the following has the highest boiling point?

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Chapter 11 - Alkanes

- a. 3,4-dimethylheptane b. nonane
c. 3,3-diethylpentane d. 4-ethylheptane

ANSWER: b

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

106. Which of the following has the lowest boiling point?

- a. 2,3-dimethylbutane b. hexane
c. 2-methylpentane d. 3-methylpentane

ANSWER: a

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

107. Which of the following will dissolve significantly in water?

- a. methane b. octane
c. pentane d. none of them

ANSWER: d

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

108. Which of the following will be essentially insoluble in water?

- a. ethane b. octane
c. pentane d. all of them

ANSWER: d

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

109. Which of the following will float on water?

- a. decane b. hexane
c. octane d. all of them

ANSWER: d

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

110. Which of the following will not dissolve appreciably in hexane?

- a. decane b. butane
c. water d. methane

ANSWER: c

POINTS: 1

TOPICS: 11.9 - WHAT ARE THE PHYSICAL PROPERTIES OF ALKANES?

111. Which of the following reactions will consume the most oxygen?

- a. complete combustion of one mole of butane
b. complete combustion of one mole of pentane
c. complete combustion of one mole of propane

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d. complete combustion of one mole of hexane

ANSWER: d

POINTS: 1

TOPICS: 11.10 - WHAT ARE THE CHARACTERISTIC CHEMICAL REACTIONS OF ALKANES?

112. How many moles of O_2 are consumed by the complete combustion of one mole of propane, C_3H_8 ?

- a. 1
- b. 3
- c. 5
- d. 7

ANSWER: c

POINTS: 1

TOPICS: 11.10 - WHAT ARE THE CHARACTERISTIC CHEMICAL REACTIONS OF ALKANES?

113. How many moles of molecular oxygen are consumed by the complete combustion of one mole of butane, C_4H_{10} ?

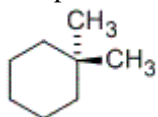
- a. 4
- b. 6.5
- c. 9
- d. 14

ANSWER: b

POINTS: 1

TOPICS: 11.10 - WHAT ARE THE CHARACTERISTIC CHEMICAL REACTIONS OF ALKANES?

114. How many moles of molecular oxygen are consumed by the complete combustion of one mole of the following compound?



- a. 11
- b. 11.5
- c. 12
- d. 12.5

ANSWER: c

POINTS: 1

TOPICS: 11.10 - WHAT ARE THE CHARACTERISTIC CHEMICAL REACTIONS OF ALKANES?

115. Which of the following reactions will consume the most oxygen?

- a. complete combustion of one mole of 2,3-dimethylhexane
- b. complete combustion of one mole of 2,3,4-trimethylpentane
- c. complete combustion of one mole of octane
- d. None, they all consume the same amount of oxygen.

ANSWER: d

POINTS: 1

TOPICS: 11.10 - WHAT ARE THE CHARACTERISTIC CHEMICAL REACTIONS OF ALKANES?

116. Which of the following reactions will consume the most oxygen?

- a. complete combustion of one mole of 3-ethylheptane
- b. complete combustion of one mole of 3,5-dimethylheptane
- c. complete combustion of one mole of 2,2-dimethyloctane
- d. None, they all consume the same amount of oxygen.

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ANSWER: c

POINTS: 1

TOPICS: 11.10 - WHAT ARE THE CHARACTERISTIC CHEMICAL REACTIONS OF ALKANES?

117. The production of chloromethane by the reaction of methane gas with chlorine gas is an example of which type of reaction?

- a. oxidation
- b. reduction
- c. substitution
- d. combustion

ANSWER: c

POINTS: 1

TOPICS: 11.10 - WHAT ARE THE CHARACTERISTIC CHEMICAL REACTIONS OF ALKANES?

118. Which of the following best describes the experimental conditions under which an alkane can be chlorinated or brominated?

- a. in the dark at room temperature
- b. only at room temperature upon exposure to light
- c. only in the dark at temperatures exceeding about 100°C
- d. either at room temperature upon exposure to light or in the dark at temperatures exceeding about 100°C

ANSWER: d

POINTS: 1

TOPICS: 11.10 - WHAT ARE THE CHARACTERISTIC CHEMICAL REACTIONS OF ALKANES?

119. Freons have been implicated in the depletion of which of the following atmospheric gases?

- a. carbon dioxide
- b. nitrogen
- c. oxygen
- d. ozone

ANSWER: d

POINTS: 1

TOPICS: 11.11 - WHAT ARE SOME IMPORTANT HALOALKANES?

120. Which of the following statements is true?

- a. Carbon tetrachloride, CCl₄ was once widely used as a degreasing solvent.
- b. Carbon tetrachloride, CCl₄ is both toxic and carcinogenic.
- c. Dichloromethane CH₂Cl₂ is currently a widely used organic solvent.
- d. All three statements are true.

ANSWER: d

POINTS: 1

TOPICS: 11.11 - WHAT ARE SOME IMPORTANT HALOALKANES?

121. The IUPAC name for one of the freons is 1,1,1-trichloro-2-fluoroethane. How many other constitutional isomers are there of this compound?

- a. 1
- b. 2
- c. 3
- d. 4

ANSWER: b

POINTS: 1

TOPICS: 11.11 - WHAT ARE SOME IMPORTANT HALOALKANES?

Chapter 11 - Alkanes

122. The IUPAC name for one of the freons is 1,1-dichloro-2,2-difluoroethane. How many other constitutional isomers are there of this compound?

- a. 1 b. 2
- c. 3 d. 4

ANSWER: c

POINTS: 1

TOPICS: 11.11 - WHAT ARE SOME IMPORTANT HALOALKANES?

123. How many different constitutional isomers are there with the molecular formula $C_2H_4Br_2$?

- a. 1 b. 2
- c. 3 d. 4

ANSWER: b

POINTS: 1

TOPICS: 11.11 - WHAT ARE SOME IMPORTANT HALOALKANES?

124. How many different constitutional isomers are there with the molecular formula $C_2H_3Br_3$?

- a. 1 b. 2
- c. 3 d. 4

ANSWER: b

POINTS: 1

TOPICS: 11.11 - WHAT ARE SOME IMPORTANT HALOALKANES?

125. How many different hydrocarbons are typically found a sample of unrefined petroleum?

- a. about 5 b. about 50
- c. about 100 d. over a 1000

ANSWER: d

POINTS: 1

TOPICS: 11.5 - WHERE DO WE OBTAIN ALKANES?

126. Compounds found in which of the following products are removed from the bottom of the fractional distillation tower used in the refining of petroleum?

- a. asphalt b. lubricating oil
- c. fuel oil d. gasoline

ANSWER: a

POINTS: 1

TOPICS: 11.5 - WHERE DO WE OBTAIN ALKANES?

127. Compounds found in which of the following products are removed from closest to the top of the fractional distillation tower used in the refining of petroleum?

- a. asphalt b. lubricating oil
- c. fuel oil d. gasoline

ANSWER: d

POINTS: 1

TOPICS: 11.5 - WHERE DO WE OBTAIN ALKANES?

Chapter 11 - Alkanes

128. What is the typical size of the hydrocarbons found in gasoline?

- a. C₅ to C₁₂ b. C₁₂ to C₁₆
c. C₁₅ to C₁₈ d. > C₂₀

ANSWER: a

POINTS: 1

TOPICS: 11.5 - WHERE DO WE OBTAIN ALKANES?

129. What is the typical size of the hydrocarbons found in lubricating oil?





- a. C₅ to C₁₂ b. C₁₂ to C₁₆
c. C₁₅ to C₁₈ d. C₁₆ to C₂₀

ANSWER: d

POINTS: 1

TOPICS: 11.5 - WHERE DO WE OBTAIN ALKANES?

130. Which of the following line-angle formulas represents butane?

- a.  b. 
c.  d. 

ANSWER: c

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

131. The line-angle formula  represents which of the following alkanes?

- a. heptane b. hexane
c. pentane d. octane

ANSWER: a

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

132. Which of the following statements is false?

- a. Petroleum was formed from the decomposition of marine plants and animals.
b. Petroleum is refined using fractional distillation.
c. Short chain hydrocarbons derived from petroleum are used for asphalt.
d. Diesel fuel is derived from a higher boiling fraction of petroleum than gasoline.

ANSWER: c

POINTS: 1

TOPICS: 11.5 - WHERE DO WE OBTAIN ALKANES?

133. Which of the following statements is false?

- a. Butane can exist in an infinite number of different conformations.
b. At any given time, most butane molecules exist in the most crowded conformation.
c. The different conformations of butane can readily interconvert by bond rotation.
d. All three statements are false.

ANSWER: b

POINTS: 1

Chapter 11 - Alkanes

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

134. Consider the following ball and stick model.



Which of the following is another way of showing this same structure?

- a. C_5H_{10}
- b. $CH_3CH_2CH_2CH_2CH_3$
- c.



- d. All are equivalent representations.

ANSWER: b

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

135. Which of the following is correct when constructing a line-angle formula for an alkane?

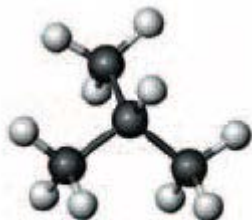
- a. Each line represents a carbon to carbon bond.
- b. Each vertex represents a hydrogen atom.
- c. A line ending is space represent a carbon atom to which two hydrogen atoms are attached.
- d. All are correct in the construction of a line-angle formula.

ANSWER: a

POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

136. Consider the following ball and stick model.



Which of the following represents a constitutional isomer of this compound?

- a. methylpropane
- b. $CH_3CH_2CH_2CH_2CH_3$
- c.



- d. None represent constitutional isomers.

ANSWER: c

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POINTS: 1

TOPICS: 11.2 - HOW DO WE WRITE STRUCTURAL FORMULAS OF ALKANES?

137. Consider the following ball and stick model.



If the hydrogen atom indicated by the arrow was removed and a $\text{—CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ group was attached, what would the name of the resulting compound?

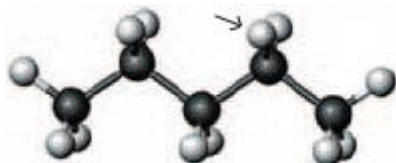
- a. butylpentane
- b. nonane
- c. octane
- d. None of these are a correct name for the resulting compound.

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

138. Consider the following ball and stick model.



If the hydrogen atom indicated by the arrow was removed and a $\text{—CH}_2\text{CH}_2\text{CH}_3$ group was attached, what would the name of the resulting compound?

- a. propylpentane
- b. 4-methylheptane
- c. octane
- d. None of these are a correct name for the resulting compound.

ANSWER: b

POINTS: 1

TOPICS: 11.4 - HOW DO WE NAME ALKANES?

139. Consider the following ball and stick model.



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If the hydrogen atom indicated by the arrow was removed, what is the name given to this alkyl group?

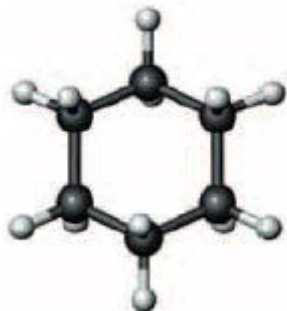
- a. isopropyl
- b. butyl
- c. *sec*-butyl
- d. *tert*-butyl

ANSWER: d

POINTS: 1

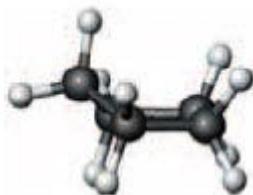
TOPICS: 11.4 - HOW DO WE NAME ALKANES?

140. Consider the following ball and stick model. This represents a top view of the model.

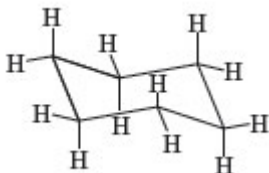


Which of the following is **not** equivalent representation of this compound?

a.



b.



c.



d. All are representations of the compound.

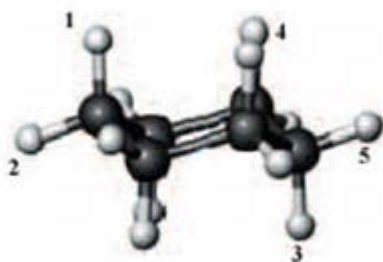
ANSWER: a

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

141. Consider the following ball and stick model.

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Which of the following is correct description?

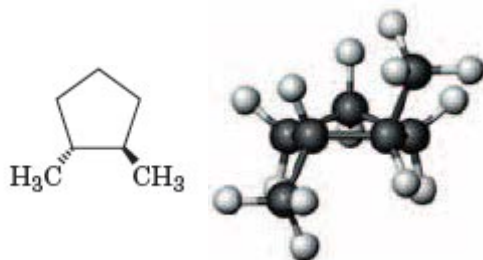
- a. 1, 3, and 4 represent axial positions and 2, and 5 represent equatorial positions.
- b. 1, 3, and 4 represent equatorial positions and 2, and 5 represent axial positions.
- c. All represent equatorial positions.
- d. All represent axial positions.

ANSWER: a

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?

142. Consider the following ball and stick models.



What do these two representations have in common?

- a. dimethyl derivatives of cyclohexane
- b. *cis* isomers
- c. *trans* isomers of different compounds
- d. same compound

ANSWER: d

POINTS: 1

TOPICS: 11.7 - WHAT ARE THE SHAPES OF ALKANES AND CYCLOALKANES?