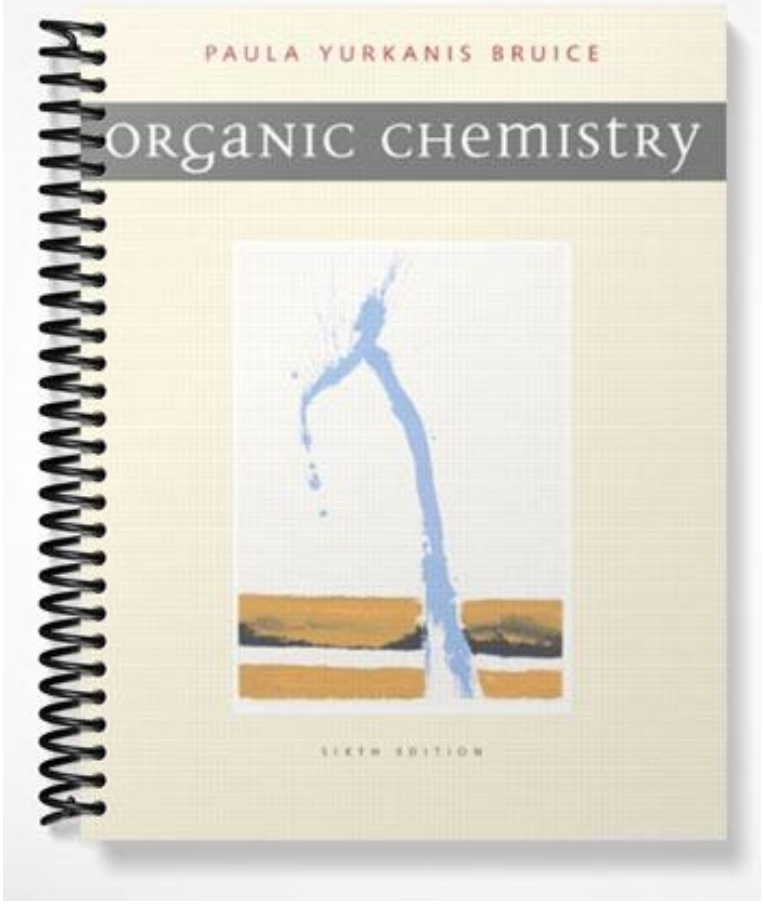
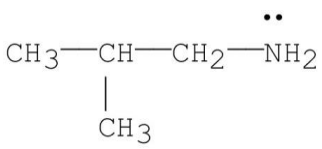
TEST BANK

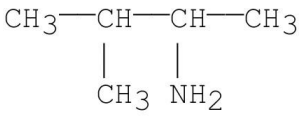


***Organic Chemistry, 6e* (Bruice)**
Chapter 2 An Introduction to Organic Compounds

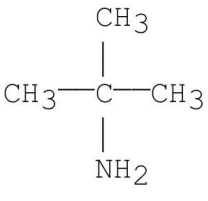
1) Which of the following is a tertiary amine?
A)



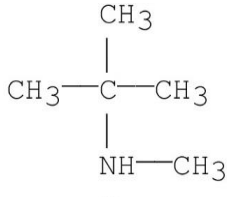
B)



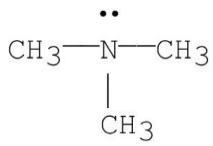
C)



D)



E)

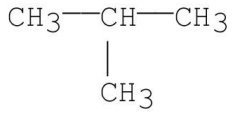


Answer: E
Section: 2-1

2) There are 8 isomers that have the molecular formula $C_5H_{11}Br$. How many of these are tertiary alkyl bromides?
A) 0
B) 1
C) 2
D) 3
E) 8
Answer: B
Section: 2-1

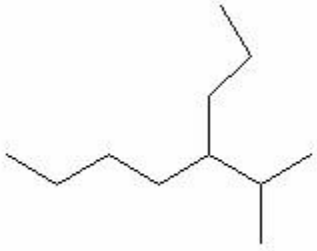
3) Which of the following is *sec*-butyl alcohol?
A) $CH_3CH_2CH_2CH_2OH$
B) $CH_3CH(OH)CH_2CH_3$
C) $(CH_3)_2CHCH_2OH$
D) $(CH_3)_2CHOH$
E) $(CH_3)_2CHOCH_3$
Answer: B
Section: 2-1

4) What is the common name for the following structure?



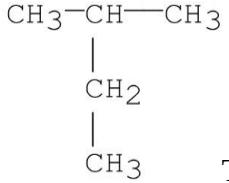
A) Isobutane
B) Isopropylmethane
C) *t*-Butane
D) *n*-Butane
E) *sec*-Butane
Answer: A
Section: 2-2

5) Give the IUPAC name for the following structure:



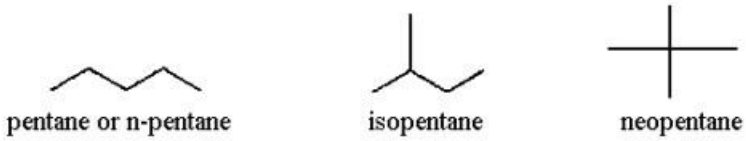
A) 2-methyl-3-ethylheptane
B) 3-ethyl-2-methylheptane
C) 5-Isopropyloctane
D) 4-Isopropyloctane
E) 2-methyl-3-propylheptane
Answer: D
Section: 2-2

6) There is something wrong with the following name. Write the structure and correct the name: 2-ethylpropane.
Answer:



The correct name is 2-methylbutane.
Section: 2-2

7) Give structures for the three isomers with molecular formula C_5H_{12} and provide the common name of each.
Answer:

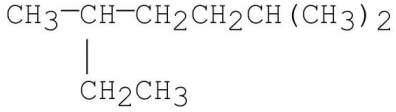


Section: 2-2

8) Provide an acceptable name for the alkane shown below.

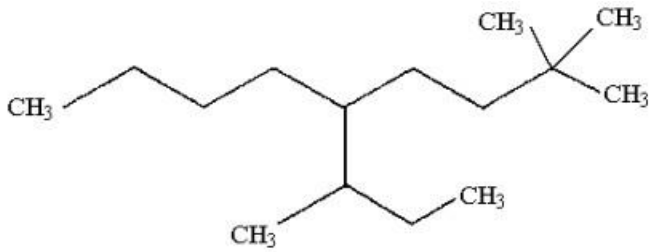
$CH_3CH_2CH_2CH_2CH_2CH_3$
Answer: hexane or n-hexane
Section: 2-2

9) Provide an acceptable name for the alkane shown below.



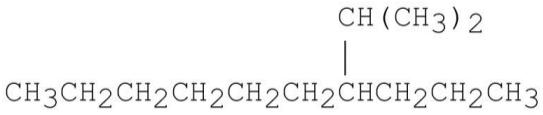
Answer: 2, 5-dimethylheptane
Section: 2-2

10) Provide an acceptable name for the alkane shown below.



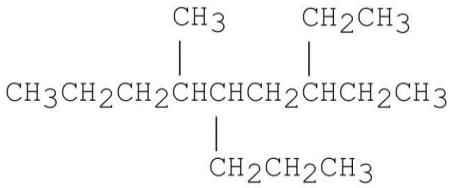
Answer: 5-*sec*-butyl-2, 2-dimethylnonane or
2, 2-dimethyl-5-(1-methylpropyl) nonane
Section: 2-2

11) Provide an acceptable name for the alkane shown below.



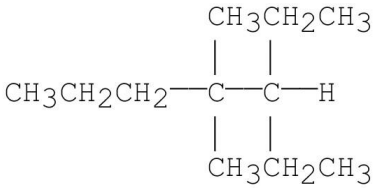
Answer: 4-isopropyldecane or 4-(1-methlyethyl) decane
Section: 2-2

12) Provide an acceptable name for the alkane shown below.



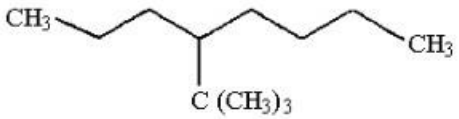
Answer: 3-ethyl-6-methyl-5-propylnonane
Section: 2-2

13) Provide an acceptable name for the alkane shown below.



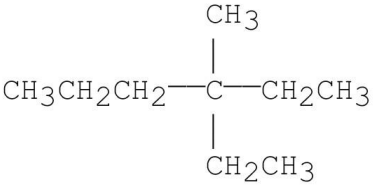
Answer: 3-ethyl-4, 4-dimethylheptane
Section: 2-2

14) Draw an acceptable structure for 4-*t*-butyloctane.
Answer:



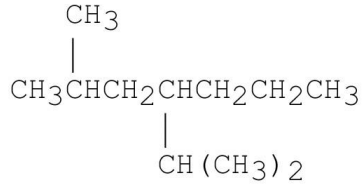
Section: 2-2

15) Draw an acceptable structure for 3-ethyl-3-methylhexane.
Answer:



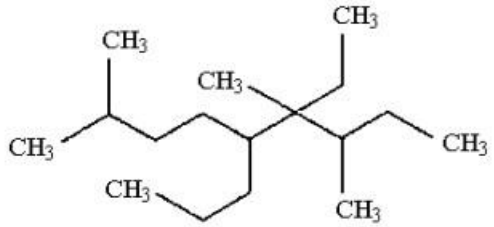
Section: 2-2

16) Draw an acceptable structure for 4-isopropyl-2-methylheptane.
Answer:



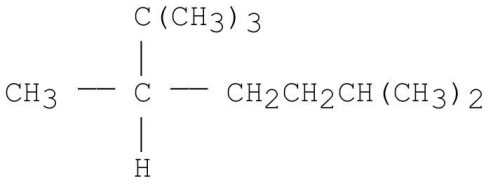
Section: 2-2

17) Draw an acceptable structure for 6-ethyl-2, 6, 7-trimethyl-5-propylnonane.
Answer:



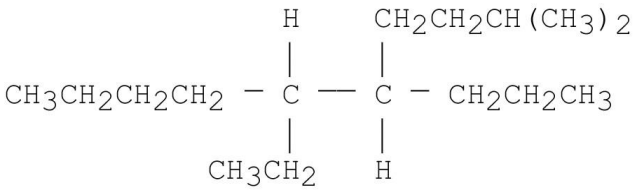
Section: 2-2

18) Provide an acceptable name for the alkane shown below.



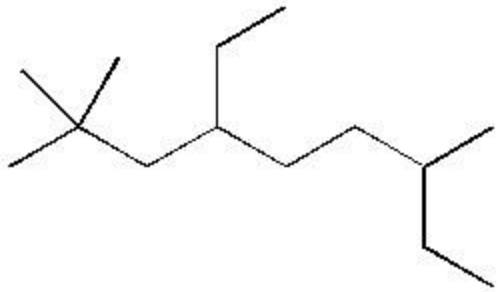
Answer: 2, 2, 3, 6-tetramethylheptane
Section: 2-2

19) Provide an acceptable name for the alkane shown below.



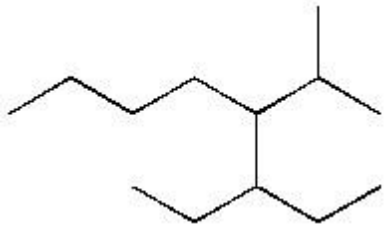
Answer: 6-ethyl-2-methyl-5-propyldecane
Section: 2-2

20) Give the systematic name of the alkane shown below.



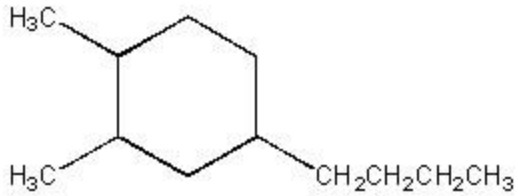
Answer: 4-ethyl-2,2,7-trimethylnonane
Section: 2-2

21) Give the systematic name of the alkane shown below.



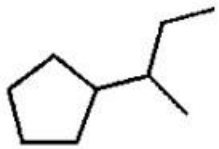
Answer: 3-ethyl-4-isopropyloctane
Section: 2-2

22) Give the systematic name of the cycloalkane shown below.



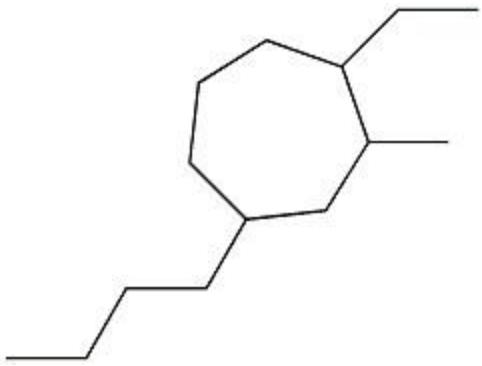
Answer: 4-butyl-1,2-dimethylcyclohexane
Section: 2-3

23) Draw an acceptable structure for *sec*-butylcyclopentane.
Answer:



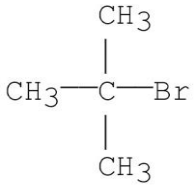
Section: 2-3

24) Provide the systematic name of the compound shown.



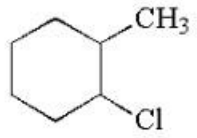
Answer: 4-butyl-1-ethyl-2-methylcycloheptane
Section: 2-3

25) What is the common name for the following structure?



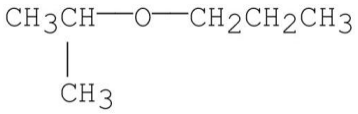
A) Isobutyl bromide
B) *t*-Butyl bromide
C) Neobutyl bromide
D) *sec*-Butyl bromide
E) Isopropyl methyl bromide
Answer: B
Section: 2-4

26) Give the IUPAC name for the following compound:



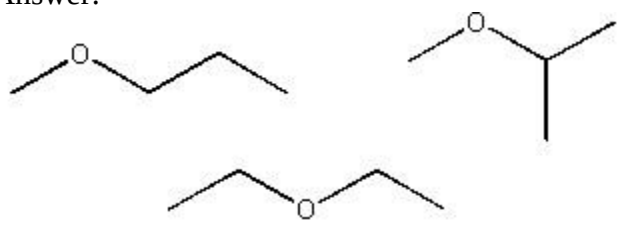
A) 1-chloro-2-methylcyclohexane
B) 1-methyl-2-chlorocyclohexane
C) 1-chloro-5-methylcyclohexane
D) 1-methyl-5-chlorocyclohexane
E) 1, 2-chloromethylcyclohexane
Answer: A
Section: 2-4

27) Which of the following is diisopropyl ether?
A) $CH_3CH_2CH_2\square O\square CH_2CH_2CH_3$
B)



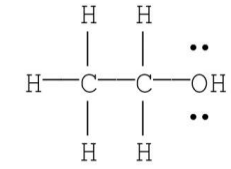
C) $CH_3CH_2CH_2OCH(CH_3)_2$
D) $(CH_3)_3COC(CH_3)_3$
E) $(CH_3)_2CH)CH(CH_3)_2$
Answer: E
Section: 2-5

28) Draw all ethers with molecular formula $C_4H_{10}O$.
Answer:

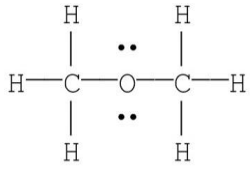


Section: 2-5

29) Draw all possible constitutional isomers for C_2H_6O and give common names for each structure.
Answer:



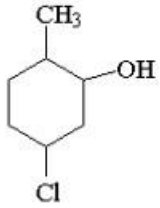
Ethyl alcohol



Dimethyl ether

Section: 2-5 and 2-6

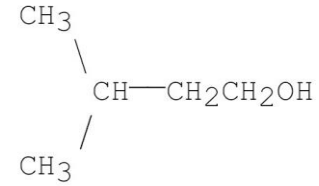
30) Give the IUPAC name for the following structure:



A) 3-chloro-2-methylcyclohexanol
B) 2-methyl-5-chlorocyclohexanol
C) 1-chloro-4-methylcyclohexanol
D) 5-chloro-2-methylcyclohexanol
E) 2-methyl-3-chlorocyclohexanol
Answer: D
Section: 2-6

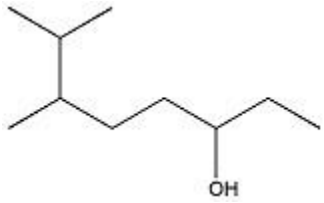
31) Which of the following compounds <u>does</u> <u>not</u> have the molecular formula $C_6H_{14}O$?
A) 1-hexanol
B) 2-hexanol
C) 3-methyl-2-pentanol
D) 3-methyl-3-pentanol
E) cyclohexanol
Answer: E
Section: 2-6

32) Give the structure of isopentyl alcohol.
Answer:



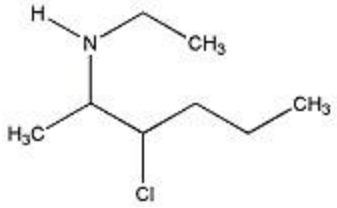
Section: 2-6

33) Provide the systematic name of the compound shown.



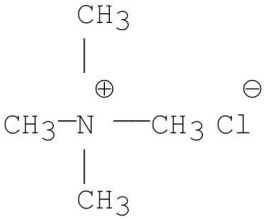
Answer: 6,7-dimethyl-3-octanol
Section: 2-6

34) Draw the structure of 3-chloro-*N*-ethyl-2-hexanamine.
Answer:



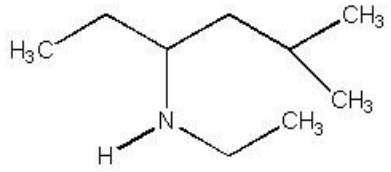
Section: 2-7

35) Give the structure of tetramethylammonium chloride.
Answer:



Section: 2-7

36) Give the structure of *N*-ethyl-5-methyl-3-hexanamine.
Answer:



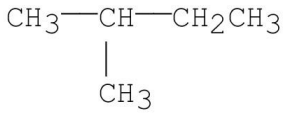
Section: 2-7

37) Fluorine is more electronegative than chlorine yet the carbon-fluorine bond in CH_3-F is shorter than CH_3-Cl. Explain.
Answer: Chlorine is a larger atom than fluorine and uses a 3p rather than 2p orbital. The overlap of a $2sp^3$ orbital with a 3p orbital is not as good as the overlap of a $2sp^3$ orbital with a 2p orbital, causing the bond to be longer and weaker.
Section: 2-8

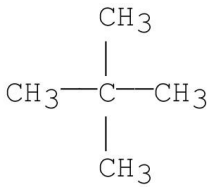
38) Which of the following will have the lowest boiling point?
A) CH_3Cl
B) CH_4
C) CH_2Cl_2
D) $CHCl_3$
E) CCl_4
Answer: B
Section: 2-9

39) Which of the compounds below will form hydrogen bonds between its molecules?
A) $CH_3CH_2CH_2F$
B) lj$CH_3CH_2CH_2CH_3$
C) $(CH_3)_3N$
D) $CH_3CH_2OCH_3$
E) $CH_3NHCH_2CH_3$
Answer: E
Section: 2-9

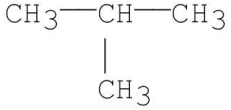
40) Which of the following has the greatest van der Waal's interaction between molecules of the same kind?
A)



B) $CH_3CH_2CH_2CH_3$
C)



D) $CH_3CH_2CH_2CH_2CH_3$
E)

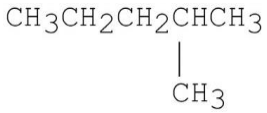


Answer: D
Section: 2-9

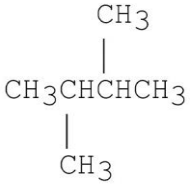
41) Which of the following has the lowest boiling point?

A) $CH_3CH_2CH_2CH_2CH_2CH_3$

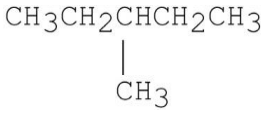
B)



C)



D)



E) $CH_3CH_2CH_2CH_2CH_2CH_2CH_3$

Answer: C
Section: 2-9

42) Which of the following has the greatest solubility in $CH_3CH_2CH_2CH_3$?

A) CH_3OH

B) $CH_3O^-\ Na^+$

C) CH_3NH_2

D) CH_3OCH_3

E) $(CH_3)_3CH$

Answer: E
Section: 2-9

43) Which of the following is the most soluble in H_2O?

A) CH_3OCH_3

B) CH_3CH_2OH

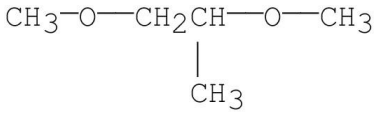
C) CH_3CH_2Cl

D) $CH_3CH_2CH_3$

E) CH_3CHO

Answer: B
Section: 2-9

44) Which of the following would have the highest boiling point?
A) $CH_3CH_2\square O\square CH_2CH_2\square O\square CH_3$
B) $CH_3\square O\square CH_2CH_2CH_2\square O\square CH_3$
C) $HO\square CH_2CH_2CH_2CH_2\square OH$
D) $CH_3CH_2\square O\square CH_2\square O\square CH_2CH_3$
E)

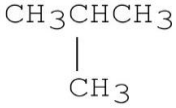


Answer: C
Section: 2-9

45) Consider the three isomeric alkanes *n*-hexane, 2, 3-dimethylbutane, and 2-methylpentane. Which of the following correctly lists these compounds in order of increasing boiling point?
A) 2, 3-dimethylbutane < 2-methylpentane < *n*-hexane
B) 2-methylpentane < *n*-hexane < 2, 3-dimethylbutane
C) 2-methylpentane < 2, 3-dimethylbutane < *n*-hexane
D) *n*-hexane < 2-methylpentane < 2, 3-dimethylbutane
E) *n*-hexane < 2, 3-dimethylbutane < 2-methylpentane
Answer: A
Section: 2-9

46) What is the strongest intermolecular force present in liquid ethanol?
A) induced dipole-induced dipole
B) dipole-dipole, specifically hydrogen bonding
C) dipole-dipole, but not hydrogen bonding
D) ion-dipole
E) ion-ion
Answer: B
Section: 2-9

47) Assuming roughly equivalent molecular weights, which of the following would have the highest boiling point?
A) a tertiary amine
B) a quaternary ammonium salt
C) an alcohol
D) an ether
E) an alkyl chloride
Answer: B
Section: 2-9

48) Explain why  has a lower boiling point than $CH_3CH_2CH_2CH_3$.

Answer: $CH_3CH_2CH_2CH_3$ has greater van der Waals forces because it has a greater contact area than isobutane. Therefore, the boiling point of $CH_3CH_2CH_2CH_3$ is higher.
Section: 2-9

49) Primary and secondary amines exhibit hydrogen bonding; tertiary amines do not. Explain.
Answer: The nitrogen in a tertiary amine is not attached to a hydrogen. Recall that for a molecule to exhibit hydrogen bonding it must have a hydrogen attached to a highly electronegative atom such as F, N, or O.
Section: 2-9

50) Explain why trimethylamine, $(CH_3)_3N$:, has a considerably lower boiling point than propylamine $CH_3CH_2CH_2NH_2$, even though both compounds have the same molecular formula.
Answer: Since hydrogen bonding is possible for propylamine and not for trimethylamine, the boiling point is higher for propylamine.
Section: 2-9

51) Which of the molecules below has the higher boiling point? Briefly explain your choice.

$CH_3CH_2CH_2OH$ or $CH_3CH_2OCH_3$
Answer: $CH_3CH_2CH_2OH$ has the higher boiling point since it is capable of intermolecular hydrogen bonding.
Section: 2-9

52) Would you expect sodium chloride (NaCl) to be highly soluble in the organic solvent hexane ($CH_3CH_2CH_2CH_2CH_2CH_3$)? Briefly explain your answer.
Answer: One would <u>not</u> expect NaCl to be highly soluble in hexane. NaCl is an ionic solid (i.e., a very polar material) while hexane is nonpolar. Nonpolar solvent molecules do not solvate ions well. The attractions of oppositely charged ions to each other are vastly greater than the weak attractions of the ions for the solvent.
Section: 2-9

53) Which compound is more soluble in water? Briefly explain your choice.

CH_3OCH_3 or CH_3CH_2OH
Answer: CH_3CH_2OH is more soluble in water since it can donate a hydrogen bond to water and accept a hydrogen bond from water. CH_3OCH_3 can only accept a hydrogen bond from water; it has no hydrogen which can hydrogen bond to water.
Section: 2-9

54) Which compound is more soluble in water? Briefly explain your choice.

$(CH_3)_2NH$ or $CH_3CH_2CH_3$
Answer: $(CH_3)_2NH$ is more soluble in water since it can hydrogen bond with water. Alkanes are not capable of hydrogen bonding with water.
Section: 2-9

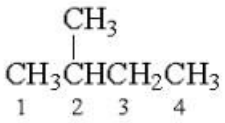
55) Which intermolecular force is primarily responsible for the interactions among alkane molecules?
Answer: Van der Waal's <u>or</u> London forces
Section: 2-9

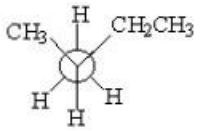
56) What is polarizability and how is it related to the size of an atom?
Answer: Polarizability indicates the ease with which an electron cloud can be distorted. The larger the atom, the more loosely its nucleus holds the electrons in its outermost shell, and the more they can be distorted.
Section: 2-9

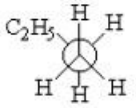
57) Arrange the following amines in order of increasing boiling point, lowest bp to highest bp: $(CH_3)_2CHCH_2CH_2NH_2$, $(CH_3)_2CHN(CH_3)_2$, and $(CH_3)_2CHCH_2NHCH_3$.
Answer: $(CH_3)_2CHN(CH_3)_2 < (CH_3)_2CHCH_2NHCH_3 < (CH_3)_2CHCH_2CH_2NH_2$
Section: 2-9

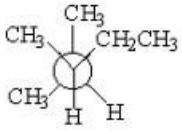
58) The eclipsed and staggered forms of ethane are said to differ in:
A) molecular formula.
B) configuration.
C) conformation.
D) constitution.
E) structure.
Answer: C
Section: 2-10

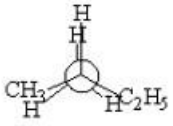
59) Which of the following is the staggered conformation for rotation about the C_1–C_2 bond in the following structure?

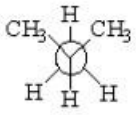


I. 

IV. 

II. 

V. 

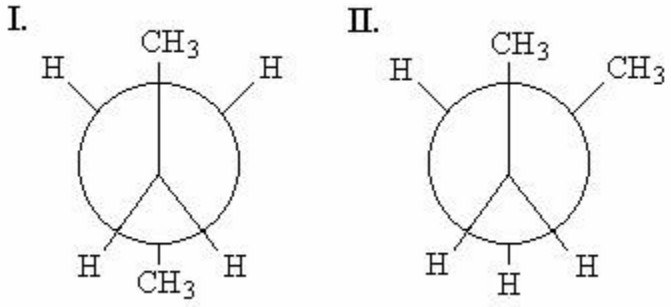
III. 

A) I
B) II
C) III
D) IV
E) V
Answer: A
Section: 2-10

60) Among the butane conformers, which occur at energy minima on a graph of potential energy versus dihedral angle?
A) gauche only
B) eclipsed and totally eclipsed
C) gauche and anti
D) eclipsed only
E) anti only
Answer: C
Section: 2-10

61) Which of the following best explains the relative stabilities of the eclipsed and staggered forms of ethane? The _____ form has the most _____ strain.
A) eclipsed; steric
B) eclipsed; torsional
C) staggered; steric
D) staggered; torsional
Answer: B
Section: 2-10

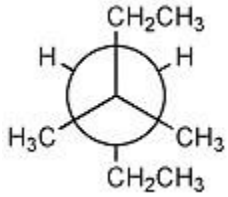
62) Which of the following best explains the reason for the relative stabilities of the conformers shown?



A) I has more torsional strain.
B) I has more steric strain.
C) II has more torsional strain.
D) II has more steric strain.
Answer: D
Section: 2-10

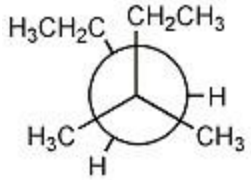
63) Which of the following statements about the conformers that result from rotation about the C2-C3 bond of butane is correct?
A) The highest energy conformer is one in which methyl groups are eclipsed by hydrogens.
B) The gauche conformer is an eclipsed one.
C) Steric strain is absent in the eclipsed forms.
D) Torsional strain is absent in the eclipsed forms.
E) none of the above
Answer: E
Section: 2-10

64) Draw the Newman projection that represents the most stable conformation of 3,3-dimethylhexane viewed along the C3-C4 bond.
Answer:



Section: 2-10

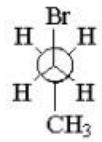
65) Draw the Newman projection that represents the least stable conformation of 3,3-dimethylhexane viewed along the C3-C4 bond.
Answer:



eclipsed

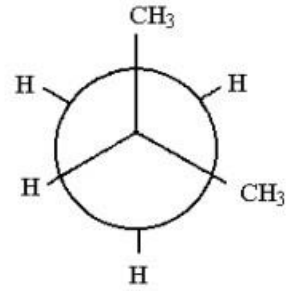
Section: 2-10

66) Draw the Newman structure for the most stable conformation of 1-bromopropane considering rotation about the C_1-C_2 bond.
Answer:



Section: 2-10

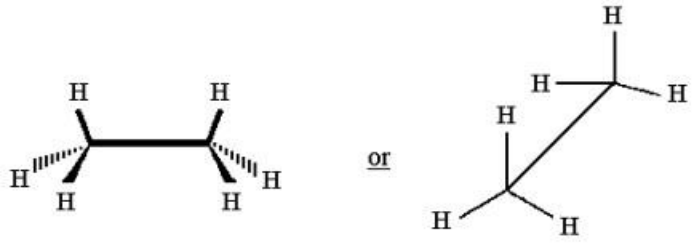
67) Draw a Newman projection of the most stable conformation of 2-methylpropane.
Answer:



Section: 2-10

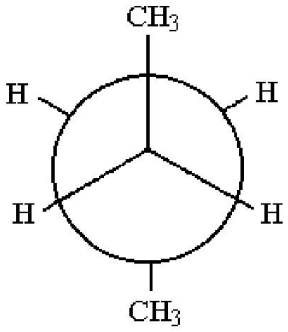
68) Define the term <u>conformation</u>.
Answer: Conformations are different arrangements of the same molecule formed by rotations about single bonds.
Section: 2-10

69) Use a sawhorse structure to depict the eclipsed conformer of ethane.
Answer:



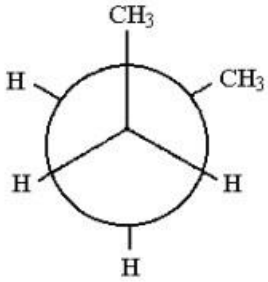
Section: 2-10

70) View a butane molecule along the C_2-C_3 bond and provide a Newman projection of the lowest energy conformer.
Answer:



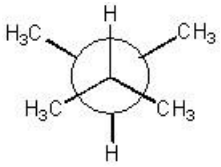
Section: 2-10

71) Provide a representation of the gauche conformer of butane.
Answer:



Section: 2-10

72) Draw the Newman projection of the most stable conformation that results due to rotation about the C_2-C_3 bond in 2,3-dimethylbutane.
Answer:



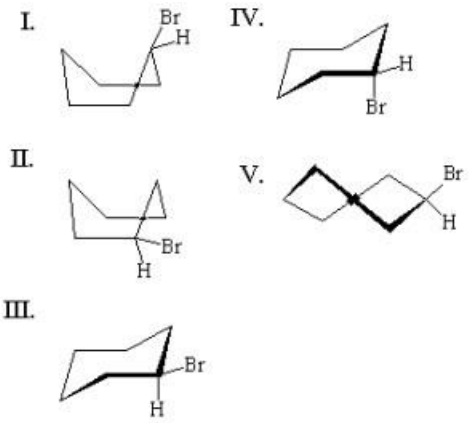
Section: 2-10

73) Which of the following correctly ranks the cycloalkanes in order of increasing ring strain per methylene?
A) cyclopropane < cyclobutane < cyclohexane < cycloheptane
B) cyclohexane < cyclopentane < cyclobutane < cyclopropane
C) cyclopentane < cyclobutane < cyclopentane < cyclopropane
D) cyclopentane < cyclopropane < cyclobutane < cyclohexane
E) cyclopropane < cyclopentane < cyclobutane < cyclohexane
Answer: B
Section: 2-11

74) Describe the source of angle strain and torsional strain present in cyclopropane.
Answer: The angle strain arises from the compression of the ideal tetrahedral bond angle of 109.5° to 60°. The large torsional strain occurs since all C-H bonds on adjacent carbons are eclipsed.
Section: 2-11

75) Which of the following correctly lists the conformations of cyclohexane in order of increasing energy?
A) chair < boat < twist-boat < half-chair
B) half-chair < boat < twist-boat < chair
C) chair < twist-boat < half-chair < boat
D) chair < twist-boat < boat < half-chair
E) half-chair < twist-boat < boat < chair
Answer: D
Section: 2-12

76) Which of the following is the <u>most</u> stable conformation of bromocyclohexane?

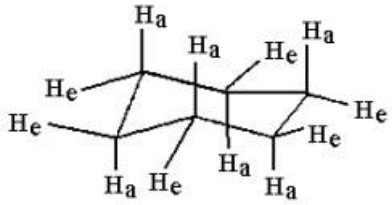


A) I
B) II
C) III
D) IV
E) V
Answer: C
Section: 2-12

77) In the boat conformation of cyclohexane, the "flagpole" hydrogens are located:
A) on the same carbon.
B) on adjacent carbons.
C) on C-1 and C-3.
D) on C-1 and C-4.
E) none of the above
Answer: D
Section: 2-12

78) Which conformer is at a local energy minimum on the potential energy diagram in the chair-chair interconversion of cyclohexane?
A) half-chair
B) planar
C) boat
D) twist-boat
E) fully eclipsed
Answer: D
Section: 2-12

79) Draw the chair conformer of cyclohexane. Label the axial hydrogens (H_a) and the equatorial hydrogens (H_e).
Answer:



Section: 2-12

80) The K_{eq} for the interconversion for the two chair forms of methylcyclohexane at 25 °C is 18. What % of the chair conformers feature an axial methyl group?
A) 95
B) 75
C) 50
D) 25
E) 5
Answer: E
Section: 2-13

81) The equilibrium constant for the ring-flip of fluorocyclohexane is 1.5 at 25 °C. Calculate the percentage of the axial conformer at the temperature.
Answer:

$$K_{eq} = \frac{[eq]}{[ax]} = 1.5$$

$$\% \text{ axial} = \frac{[ax]}{[eq] + [ax]} \cong 100\%$$

$$= \frac{[1]}{[1.5] + [1]} \cong 100\%$$

$$= 40\%$$

Section: 2-13

82) Which of the following describes the most stable conformation of *trans*-1-*tert*-butyl-3-methylcyclohexane?
A) Both groups are equatorial.
B) Both groups are axial.
C) The *tert*-butyl group is equatorial and the methyl group is axial.
D) The *tert*-butyl group is axial and the methyl group is equatorial.
E) none of the above
Answer: C
Section: 2-14

83) Name the compound shown below.

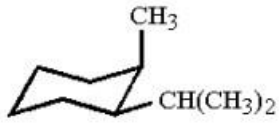
A) *trans*-1,2-dichlorocyclohexane
B) *cis*-1,2-dichlorocyclohexane
C) *trans*-1,3-dichlorocyclohexane
D) *cis*-1,3-dichlorocyclohexane
E) *trans*-1,4-dichlorocyclohexane
Answer: D
Section: 2-14

84) Which of the following has two equatorial alkyl substituents in its most stable conformation?
A) 1,1-dimethylcyclohexane
B) *cis*-1,2-dimethylcyclohexane
C) *cis*-1,3-diethylcyclohexane
D) *cis*-1,4-diethylcyclohexane
E) *trans*-1,3-diethylcyclohexane
Answer: C
Section: 2-14

85) Draw the most stable conformation of *trans*-1-*tert*-butyl-3-methylcyclohexane.
Answer:

or enantiomer
Section: 2-14

86) Draw the most stable conformer of *cis*-1-isopropyl-2-methylcyclohexane.
Answer:



or enantiomer
Section: 2-14

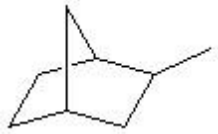
87) Draw the most stable conformation of *trans*-1-isopropyl-2-methylcyclohexane.
Answer:

or enantiomer
Section: 2-14

88) How many constitutional isomers are possible for C_6H_{14}?
A) 4
B) 5
C) 6
D) 7
E) 8
Answer: B
Section: 98

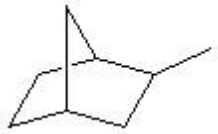
89) If an acyclic alkane hydrocarbon contains n carbon atoms, how many hydrogen atoms must it also contain?
A) n
B) n + 2
C) n - 2
D) 2n
E) 2n + 2
Answer: E
Section: 98

90) Identify the number of secondary hydrogens in the following structure.



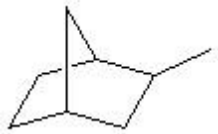
A) 4
B) 6
C) 8
D) 10
E) 12
Answer: C
Section: 2-1

91) Identify the number of tertiary carbons in the following structure.



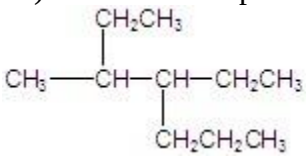
A) 2
B) 3
C) 4
D) 5
E) 6
Answer: B
Section: 2-1

92) Give the formula.



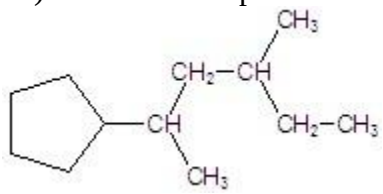
A) C_8H_8
B) C_8H_{10}
C) C_8H_{12}
D) C_8H_{14}
E) C_8H_{16}
Answer: D
Section: 2-3

93) Name the compound.



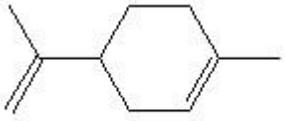
A) 2-ethyl-3-propylpentane
B) 2,3-diethylhexane
C) 4-ethyl-5-methylheptane
D) 4-methyl-3-ethylheptane
E) 4-ethyl-3-methylheptane
Answer: E
Section: 2-2

94) Name the compound.



A) 2-cyclopentyl-4-methylhexane
B) 5-cyclopentyl-3-methylhexane
C) 1-cyclopentyl-1,3-dimethylpentane
D) 2-cyclopentyl-4-methylheptane
E) 5-cyclopentyl-3-methylheptane
Answer: A
Section: 2-3

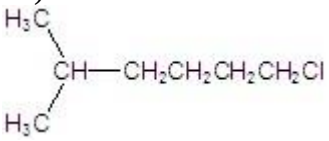
95) Determine the number of hydrogens in limonene.



limonene

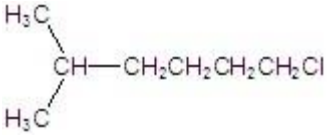
A) 8
B) 10
C) 12
D) 16
E) 18
Answer: D
Section: 2-3

96) Provide the common name of the compound.



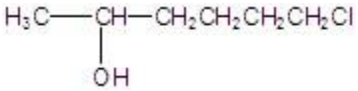
A) neoheptyl chloride
B) sec-heptyl chloride
C) isoheptyl chloride
D) tert-heptyl chloride
E) n-heptyl chloride
Answer: C
Section: 2-4

97) Provide the IUPAC name of the compound.



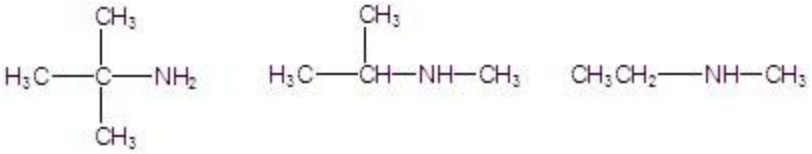
A) 2-methylheptane
B) 1-chloro-5-methylhexane
C) 6-chloro-2-methylhexane
D) 1,1-dimethyl-5-chloropentane
E) 1-chloro-5-methylhexane
Answer: B
Section: 2-4

98) Name the structure.



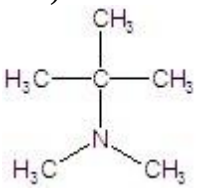
Answer: 6-chloro-2-hexanol
Section: 2-6

99) Classify the following amines.



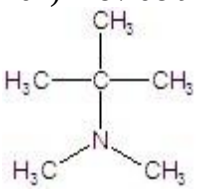
Answer: primary, secondary, secondary
Section: 2-7

100) Provide the common name of the compound.



A) tert-butyldimethylamine
B) isobutyldimethylamine
C) neobutyldimethylamine
D) sec-butyldimethylamine
E) n-butyldimethylamine
Answer: A
Section: 2-7

101) Provide the IUPAC name of the compound.



A) N,N,1,1-tetramethylethanamine
B) N,N-dimethyl-2-butanamine
C) N,N,2-trimethyl-1-propanamine
D) N,N,2-trimethylpropanamine
E) N,N,2-trimethyl-2-propanamine
Answer: E
Section: 2-7

102) Provide the IUPAC name of the compound.

$H_2NCH_2CH_2CH_2CH_2OH$

Answer: 4-amino-1-butanol
Section: 2-7

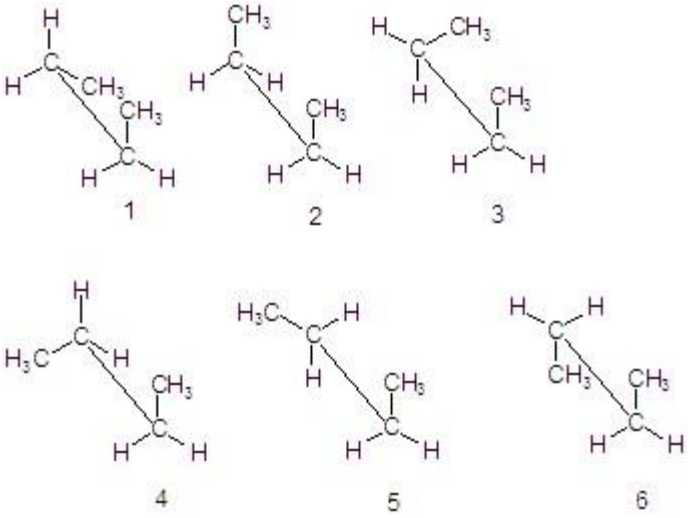
103) Identify the compound with the highest bond angle.
A) the C-O-C bond in an ether
B) the C-N-C bond in a secondary amine
C) the C-N-C bond in a quaternary amine
D) the C-O-C bond in an alcohol
E) they are all equal
Answer: C
Section: 2-8

104) Identify the compound with the highest boiling point.
A) $CH_3CH_2OCH_2CH_3$
B) $CH_3CH_2CH_2CH_2OH$
C) $CH_3CH_2CH_2CH_2NH_2$
D) $CH_3CH_2CH_2CH_2Cl$
E) $CH_3CH_2CH_2CH_2Br$
Answer: B
Section: 2-9

105) Identify the two compounds that do not have hydrogen bonding.
A) $CH_3CH_2CH_2NHCH_3$
B) $CH_3CH_2CH_2CH_2Cl$
C) $CH_3CH_2CH_2CH_2NH_2$
D) $CH_3CH_2CH_2CH_2OH$
E) $CH_3CH_2CH_2OCH_3$
Answer: B, E
Section: 2-9

106) Identify the most stable conformation of butane.
A) anti
B) eclipsed
C) gauche
D) totally eclipsed
E) adjacent
Answer: A
Section: 2-10

107) List the conformations in order of decreasing stability.



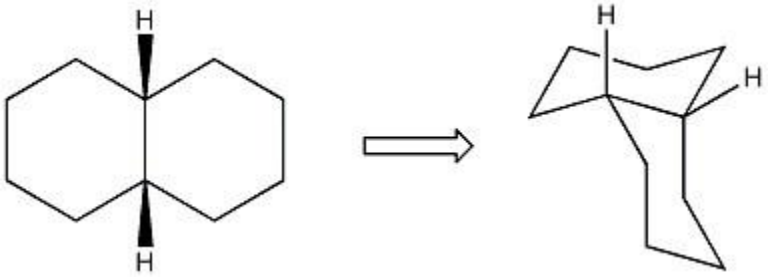
Answer: 6 > 3,5 > 1,4 > 2
Section: 2-10

108) Identify the compound where the groups are axial and equatorial.
A) *trans*-1,4-dibromocyclohexane
B) *cis*-1,4-dibromocyclohexane
C) *cis*-1,3-dibromocyclohexane
D) *trans*-1,2-dibromocyclohexane
E) none of them
Answer: B
Section: 2-14

109) Identify the least stable conformation for 1-*tert*-butyl-3-methylcyclohexane.
A) *tert*-butyl is axial and the methyl is equatorial.
B) *tert*-butyl is axial and the methyl is axial.
C) *tert*-butyl is equatorial and the methyl is axial.
D) *tert*-butyl is equatorial and the methyl is equatorial.
E) All are equally stable.
Answer: B
Section: 2-14

110) What aspect of the fused ring systems present in cholesterol make it an ideal compound to lend rigidity to cell membranes?
Answer: The *trans*-fused ring systems present in cholesterol are not able to undergo chair-chair interconversion (ring flip). This renders them a high degree of conformational rigidity.
Section: 2-15

111) Provide the chair structure of *cis*-decalin, two *cis*-fused six-membered rings.
Answer:



Section: 2-15