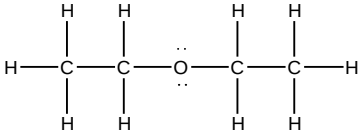
Chapter Two

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Easy

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



A) C_2H_6O
B) C_4H_6O
C) $C_4H_{10}O$
D) C_2H_4O
E) None of these
Ans: C

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Easy

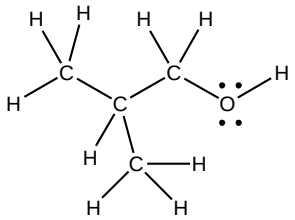
2. Which of the following compounds have a molecular formula of C_2H_6O?

I II III IV

A) I
B) II
C) III
D) IV
E) Both I & III
Ans: E

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Easy

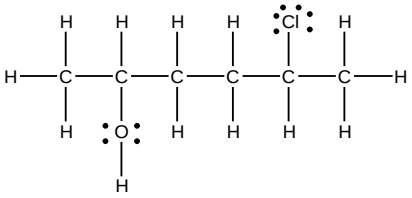
3. Which of the following is the correct condensed structure for the following compound?



A) $CH_3CH_3CH_2OH$
B) $CH_3CH_2CH_2OH$
C) $(CH_3)_2CHCH_2OH$
D) $CH_3CH_2CH_2OCH_3$
E) $CH_3C_2H_3CH_3OH$
Ans: C

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Easy

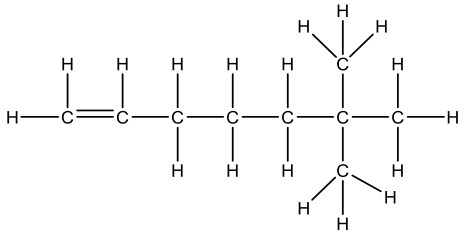
4. Which of the following is the correct condensed structure for the following compound?



A) $CH_3CHOHCH_2CHClCH_3$
B) $CH_3CHOH(CH_2)_2CHClCH_3$
C) $(CH_3)_2CHOHCH_2CH_2Cl$
D) $CH_3CHCH_2CH_2OHCH_3CHCl$
E) $CH_3C_2H_4CH_3OHCl$
Ans: B

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Medium

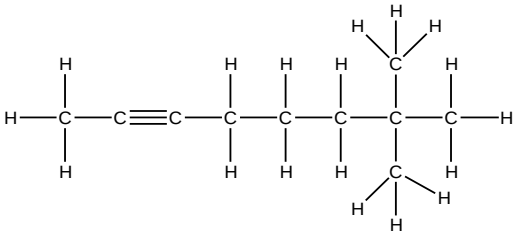
5. Which of the following is the correct condensed structure for the following compound?



A) $CH_2=CH(CH_2)_3C(CH_3)_3$
B) $CH(CH_2)_4C(CH_3)_3$
C) $(CH_3)_2CH(CH_2)_4CH_3$
D) $CH_2CH(CH_2)_3C(CH_3)_3$
E) $(CH)_3(CH_2)_3C(CH_3)_3$
Ans: A

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Medium

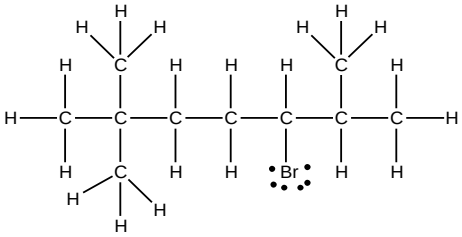
6. Which of the following is the correct condensed structure for the following compound?



A) $CH_3C_2(CH_2)_3C(CH_3)_3$
B) $CH_3CC(CH_2)_3C(CH_3)_2CH_3$
C) $(CH_3)_3C_2(CH_2)_3CH_3$
D) $CH_3C\equiv C(CH_2)_3C(CH_3)_3$
E) $CH_3CC(CH_2)_3C(CH_3)_3$
Ans: D

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Medium

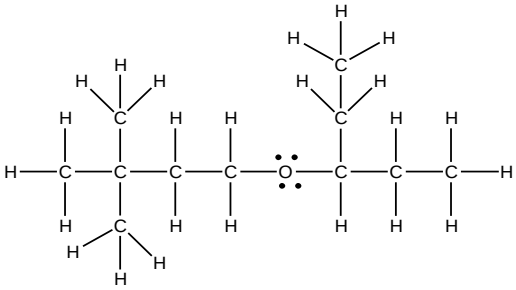
7. Which of the following is the correct condensed structure for the following compound?



A) $CH_3C(CH_3)_2(CH_2)_2(CH)BrC(CH_3)_2$
B) $CH_3CH_3CH_3C(CH_2)_2C(CH_3)_2CHBr$
C) $(CH_3)_3C(CH_2)_3BrCHCH_3CH_3$
D) $CH_3CH_3CH_3C(CH_2)_2CHBrCHCH_3CH_3$
E) $(CH_3)_3C(CH_2)_2CHBrCH(CH_3)_2$
Ans: E

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Hard

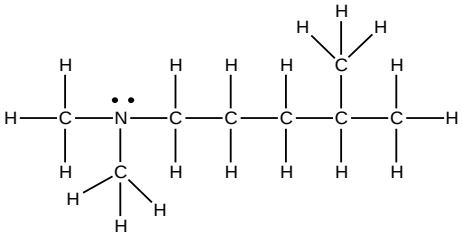
8. Provide correct condensed structure for the following compound.



Ans: $(CH_3)_3C(CH_2)_2OCH(CH_2CH_3)_2$

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Hard

9. Provide correct condensed structure for the following compound.



Ans: $(CH_3)_2N(CH_2)_3CH(CH_3)_2$

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Easy

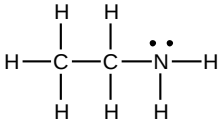
10. Which of the following is the correct molecular formula for $(CH_3CH_2)_4C$?

A) C_8H_{20}
B) C_5H_{20}
C) C_9H_{20}
D) C_6H_5
E) C_3H_{20}

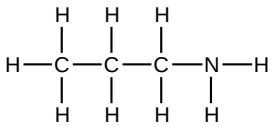
Ans: C

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Easy

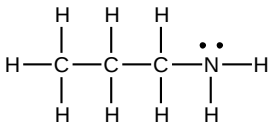
11. Which of the following is the correct Lewis structure for $CH_3(CH_2)_2NH_2$?



I



II



III

$CH_3CH_2CH_2NH_2$

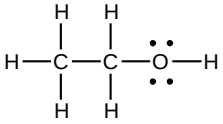
IV

A) I
B) II
C) III
D) IV
E) Both II & III

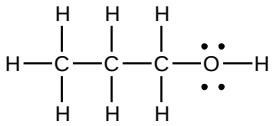
Ans: C

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Easy

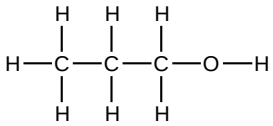
12. Which of the following is the correct Lewis structure for $CH_3(CH_2)_2OH$?



I



II



III

$CH_3CH_2CH_2OH$

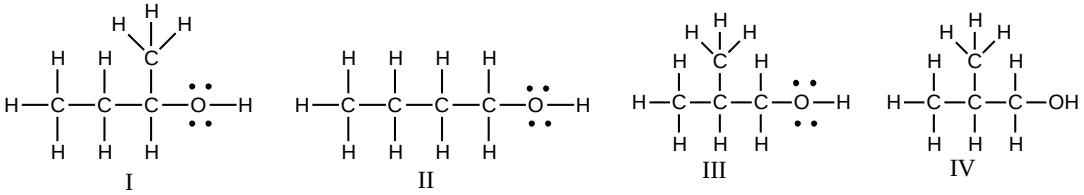
IV

A) I
B) II
C) III
D) IV
E) Both II & III

Ans: B

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Easy

13. Which of the following is the correct Lewis structure for $(CH_3)_2CHCH_2OH$?



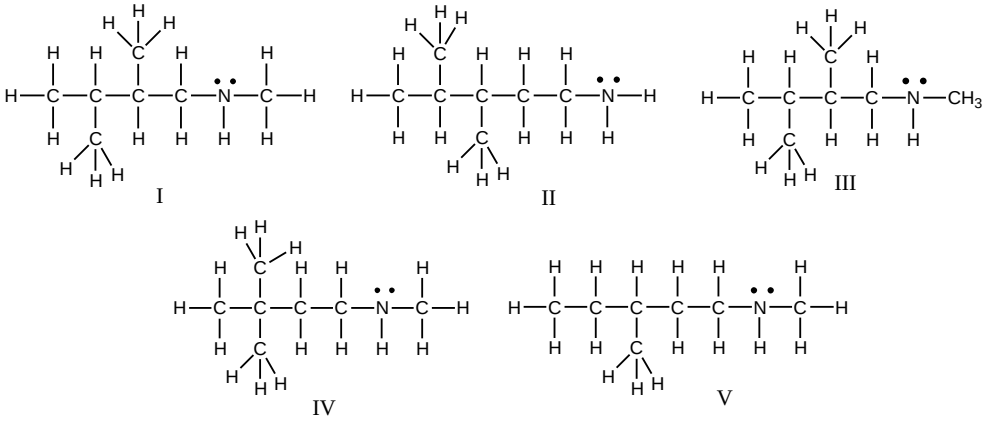
I II III IV

A) I
B) II
C) III
D) IV
E) Both III & IV

Ans: C

Topic: Molecular Representation
Section: 2.1
Difficulty Level: Medium

14. Which of the following is the correct Lewis structure for $(CH_3)_3C(CH_2)_2NHCH_3$?



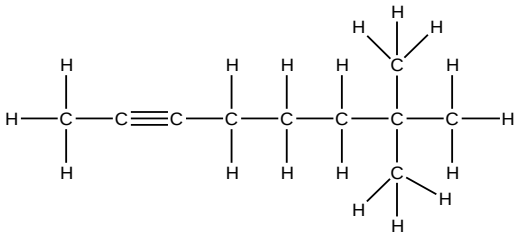
I II III IV V

A) I
B) II
C) III
D) IV
E) V

Ans: D

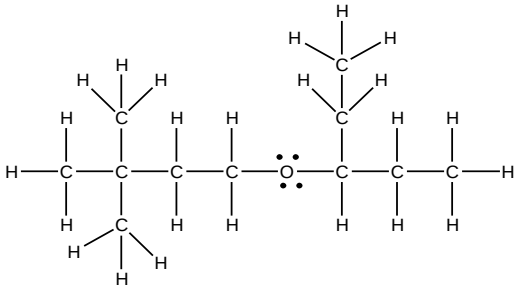
Topic: Molecular Representation
Section: 2.1
Difficulty Level: Medium

15. Draw the Lewis structure for $CH_3C{\equiv}C(CH_2)_3C(CH_3)_3$.
Ans:



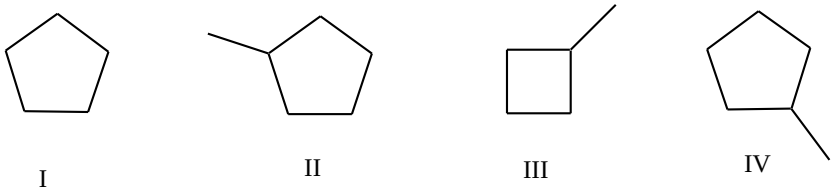
Topic: Molecular Representation
Section: 2.1
Difficulty Level: Hard

16. Draw the Lewis structure for $(CH_3)_3C(CH_2)_2OCH(CH_2CH_3)_2$.
Ans:



Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

17. Which of the following bond-line structures are of the same compound?

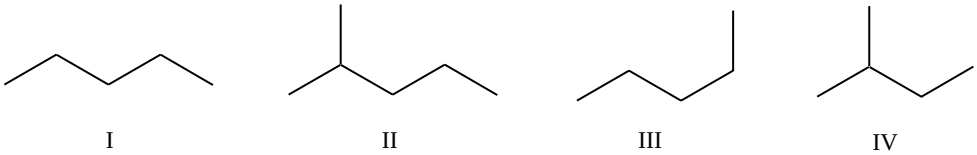


I II III IV

A) I & II
B) II & III
C) III & IV
D) II & IV
E) None of these
Ans: D

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

18. Which of the following bond-line structures are of the same compound?



I II III IV

A) I & III
B) II & III
C) III & IV
D) II & IV
E) None of these
Ans: A

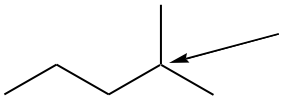
Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

19. How many H atoms are connected to the indicated carbon atom?

A) one
B) two
C) three
D) four
E) none
Ans: E

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

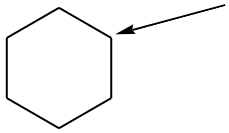
20. How many H atoms are connected to the indicated carbon atom?



A) one
B) two
C) three
D) four
E) none
Ans: A

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

21. How many H atoms are connected to the indicated carbon atom?



A) one
B) two
C) three
D) four
E) none
Ans: B

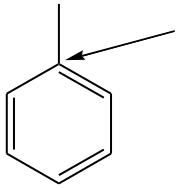
Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

22. How many H atoms are connected to the indicated carbon atom?

A) one
B) two
C) three
D) four
E) none
Ans: A

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

23. How many H atoms are connected to the indicated carbon atom?



A) one
B) two
C) three
D) four
E) none
Ans: E

Topic: Bond Line Structure
Section: 2.2

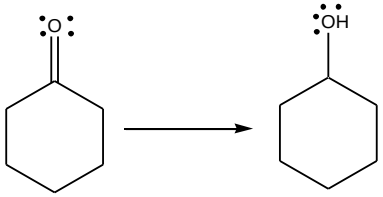
Difficulty Level: Easy

24. For the following transformation how many H atoms are added or lost?

A) Added one
B) Added two
C) Lost one
D) Lost two
E) No change
Ans: D

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

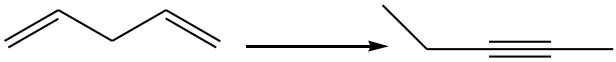
25. For the following transformation how many H atoms are added or lost?



A) Added one
B) Added two
C) Lost one
D) Lost two
E) No change
Ans: B

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

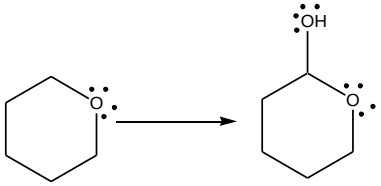
26. For the following transformation how many H atoms are added or lost?



A) Added one
B) Added two
C) Lost one
D) Lost two
E) No change
Ans: E

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

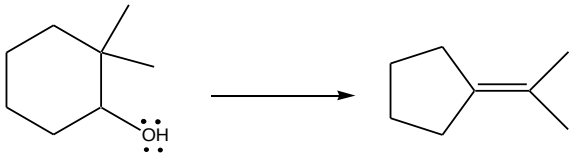
27. For the following transformation how many H atoms are added or lost?



A) Added one
B) Added two
C) Lost one
D) Lost two
E) No change
Ans: E

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Medium

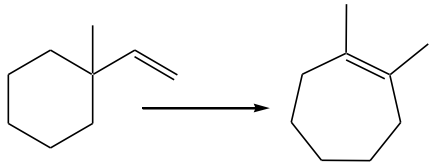
28. For the following transformation how many H atoms are added or lost?



A) Added one
B) Added two
C) Lost one
D) Lost two
E) No change
Ans: D

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Medium

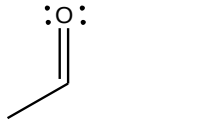
29. For the following transformation how many H atoms are added or lost?

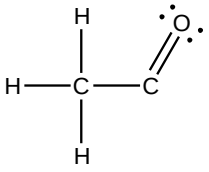


A) Added one
B) Added two
C) Lost one
D) Lost two
E) No change
Ans: E

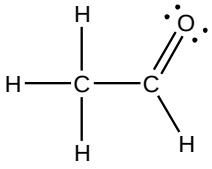
Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

30. Which of the following is the correct Lewis structure for the following compound?

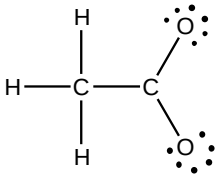




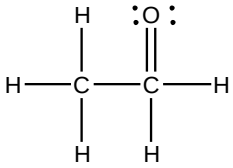
I



II



III

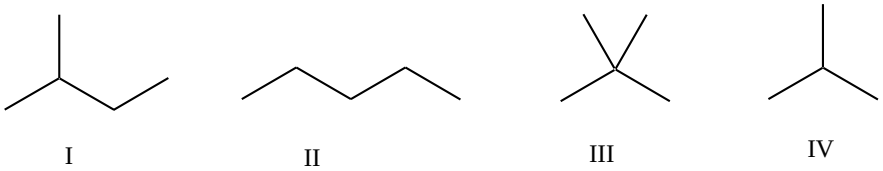


IV

A) I
B) II
C) III
D) IV
E) None of these
Ans: B

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

31. Which of the following is the correct bond-line structure for $(CH_3)_4C$?

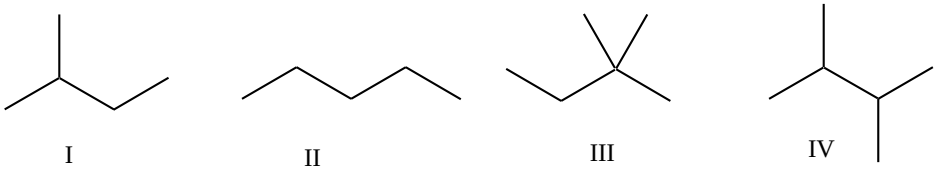


I II III IV

A) I
B) II
C) III
D) IV
E) None of these
Ans: C

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Easy

32. Which of the following is the correct bond-line structure for $(CH_3)_2CHCH_2CH_3$?

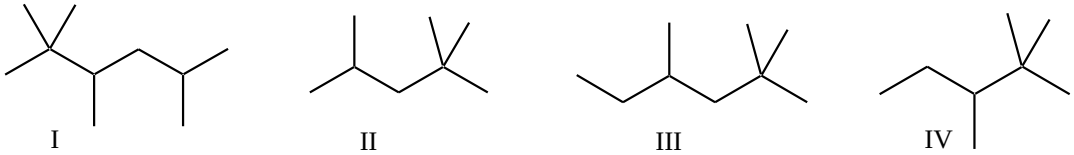


I II III IV

A) I
B) II
C) III
D) IV
E) None of these
Ans: A

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Medium

33. Which of the following is the correct bond-line structure for $(CH_3)_2CHCH_2C(CH_3)_3$?



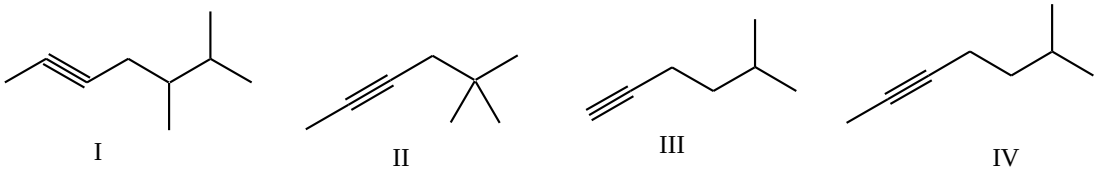
I II III IV

A) I
B) II
C) III
D) IV
E) None of these
Ans: B

Topic: Bond Line Structure
Section: 2.2

Difficulty Level: Medium

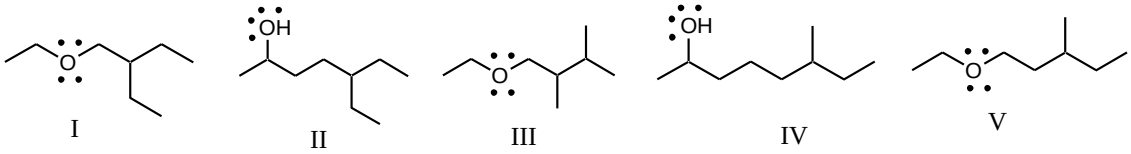
34. Which of the following is the correct bond-line structure for $CH_3C{\equiv}C(CH_2)_2CH(CH_3)_2$?



A) I
B) II
C) III
D) IV
E) None of these
Ans: D

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Medium

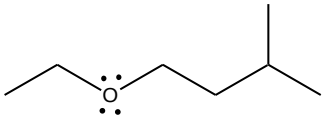
35. Which of the following is the correct bond-line structure for $CH_3CHOH(CH_2)_2CH(CH_2CH_3)_2$?



A) I
B) II
C) III
D) IV
E) V
Ans: B

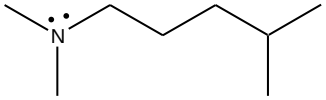
Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Medium

36. Draw a bond-line structure for $CH_3CH_2O(CH_2)_2CH(CH_3)_2$.
Ans:



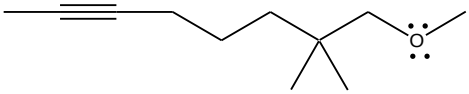
Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

37. Draw a bond-line structure for $(CH_3)_2N(CH_2)_3CH(CH_3)_2$.
Ans:



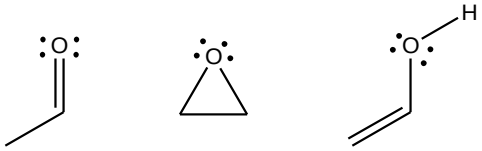
Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

38. Draw a bond-line structure for $CH_3C{\equiv}C(CH_2)_3C(CH_3)_2CH_2OCH_3$.
Ans:



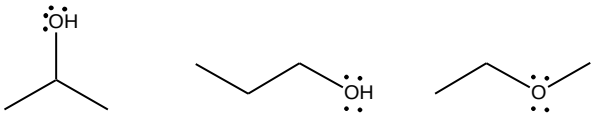
Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

39. Draw a bond-line structure for each constitutional isomer with a molecular formula of C_2H_4O.
Ans:



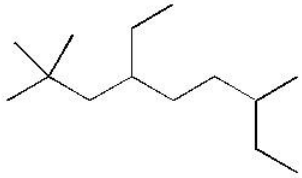
Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

40. Draw a bond-line structure for each constitutional isomer with a molecular formula of C_3H_8O.
Ans:



Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

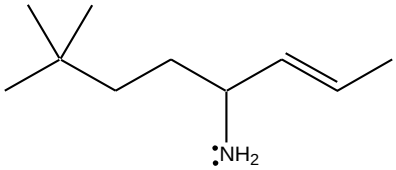
41. Provide a condensed structure for the following compound.



Ans: $(CH_3)_3CCH_2CH(CH_2CH_3)(CH_2)_2CH(CH_3)CH_2CH_3$

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

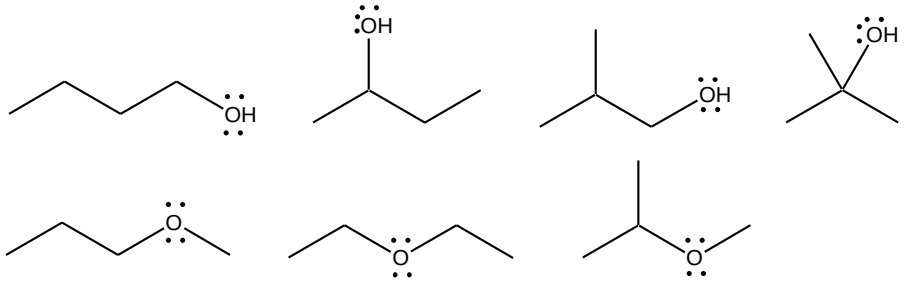
42. Provide a condensed structure for the following compound.



Ans: $(CH_3)_3C(CH_2)_2CH(NH_2)CH{=}CHCH_3$

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

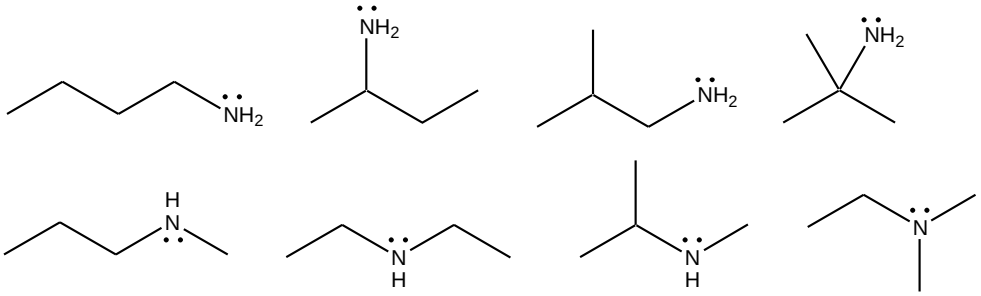
43. Draw a bond-line structure for each constitutional isomer with molecular formula $C_4H_{10}O$.
Ans:



Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

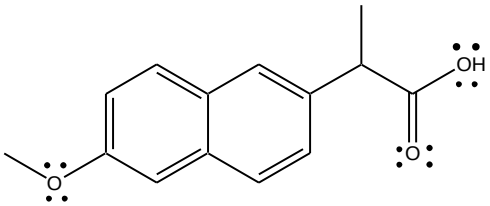
44. Draw a bond-line structure for each constitutional isomer with molecular formula $C_4H_{11}N$.

Ans:



Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Medium

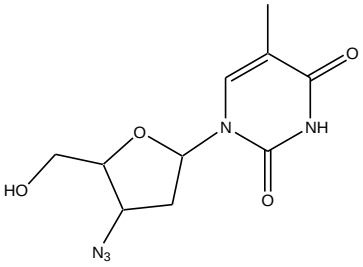
45. Naproxen, sold under the trade name Aleve, has the following structure. What is the molecular formula for naproxen?



Ans: $C_{14}H_{14}O_3$

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

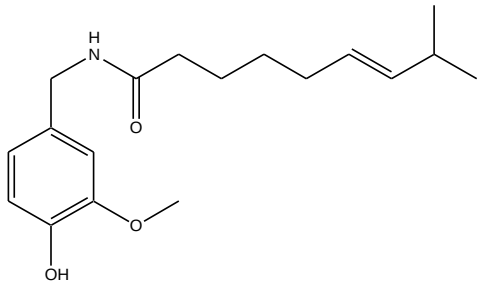
46. AZT, used in the treatment of AIDS, has the following structure. What is the molecular formula for AZT?



Ans: $C_{10}H_{13}N_5O_4$

Topic: Bond Line Structure
Section: 2.2
Difficulty Level: Hard

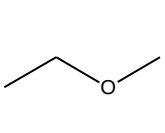
47. Capsaicin, found in peppers, has the following structure. What is the molecular formula for capsaicin?



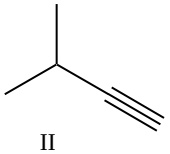
Ans: $C_{18}H_{27}NO_3$

Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Easy

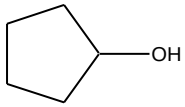
48. Which of the following compounds contain an alcohol functional group?



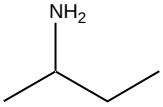
I



II



III

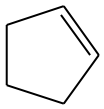


IV

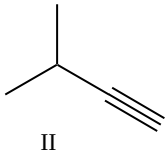
A) I
B) II
C) III
D) IV
E) None of these
Ans: C

Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Easy

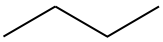
49. Which of the following compounds contain an alkene functional group?



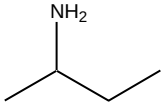
I



II



III



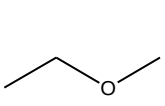
IV

A) I
B) II
C) III
D) IV
E) None of these
Ans: A

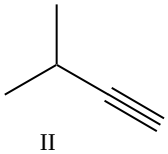
Topic: Identifying Functional Groups
Section: 2.3

Difficulty Level: Easy

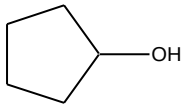
50. Which of the following compounds contain an amine functional group?



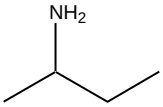
I



II



III

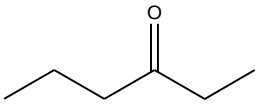


IV

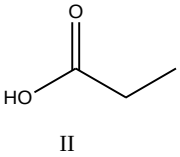
A) I
B) II
C) III
D) IV
E) None of these
Ans: D

Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Easy

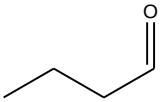
51. Which of the following compounds contain a ketone functional group?



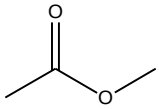
I



II



III

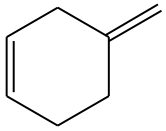


IV

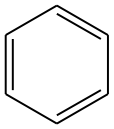
A) I
B) II
C) III
D) IV
E) All of these
Ans: A

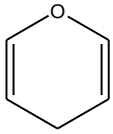
Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Easy

52. Which of the following compounds contain an aromatic ring?


I


II


III

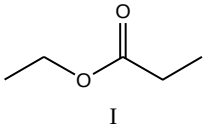


IV

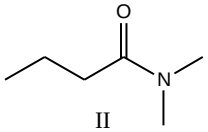
A) I
B) II
C) III
D) IV
E) Both III & IV
Ans: C

Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Easy

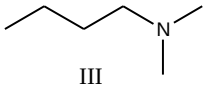
53. Which of the following compounds contain an ester functional group?



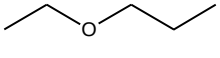
I



II



III

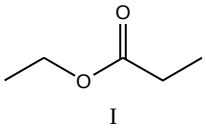


IV

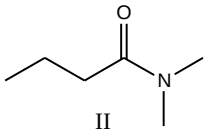
A) I
B) II
C) III
D) IV
E) Both I & IV
Ans: A

Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Easy

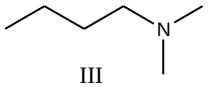
54. Which of the following compounds contain an amide functional group?



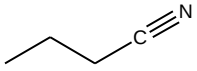
I



II



III



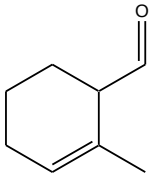
IV

A) I
B) II
C) III
D) IV
E) Both II & III
Ans: B

Topic: Identifying Functional Groups
Section: 2.3

Difficulty Level: Medium

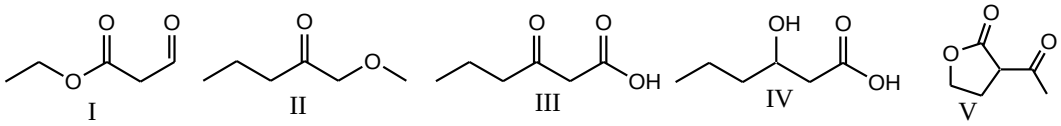
55. What functional group(s) is (are) present in the following compound?



A) ketone & alkene
B) ketone & alkyne
C) aldehyde & alkene
D) aldehyde & alkyne
E) ester & alkene
Ans: C

Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Medium

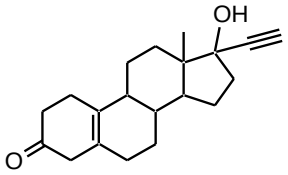
56. Which of the following compounds have both a ketone and an ester functional group?



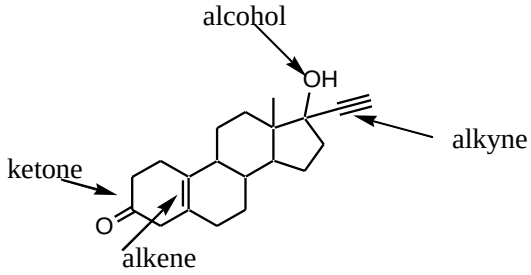
A) I
B) II
C) III
D) IV
E) V
Ans: E

Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Medium

57. Norethynodrel, a component of the first combined oral contraceptive, has the following structure. Identify the functional groups in Norethynodrel.

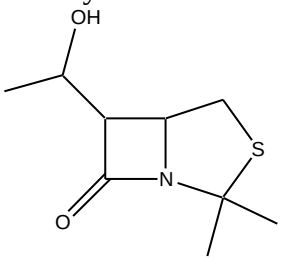


Ans:

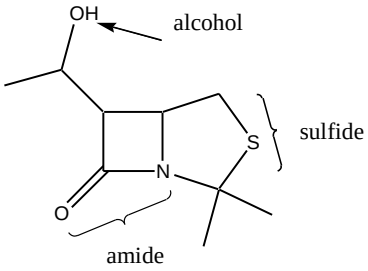


Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Medium

58. Identify the functional groups in the following compound.

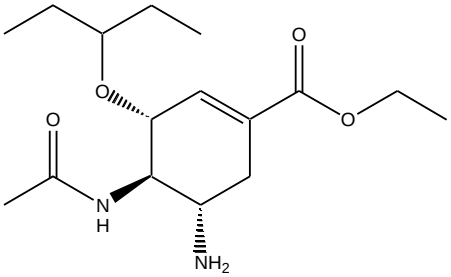


Ans:

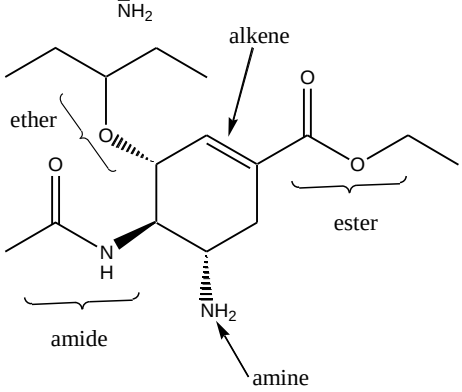


Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Hard

59. Tamiflu®, is the most effective antiviral drug used to treat avian influenza, has the following structure. Identify the functional groups in Tamiflu®.

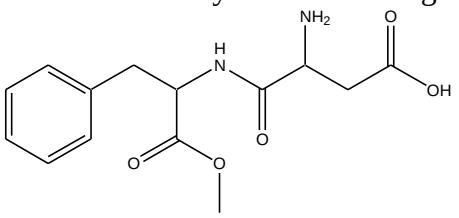


Ans:

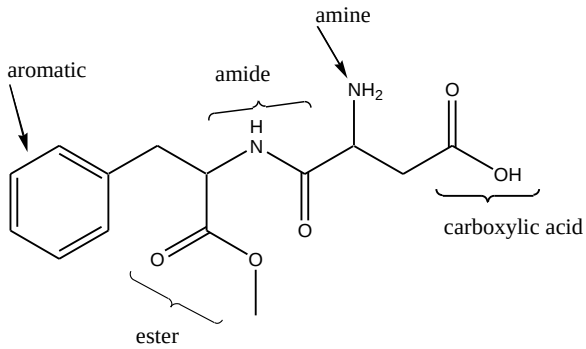


Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Hard

60. Aspartame, an artificial sweetener used in Equal® and diet beverages, has the following structure. Identify the functional groups in Aspartame.

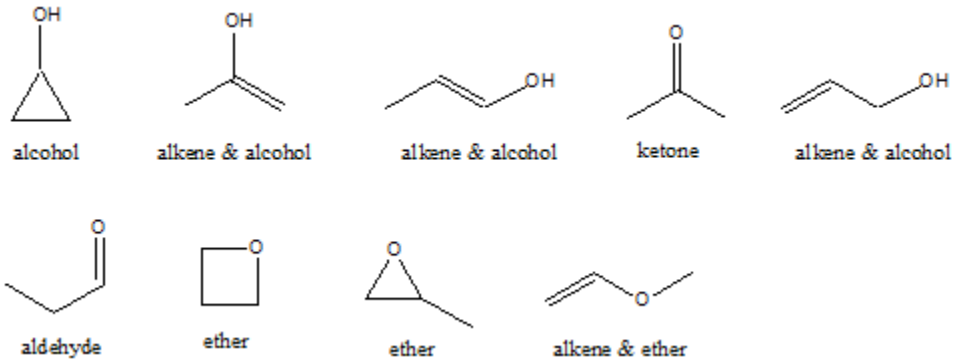


Ans:



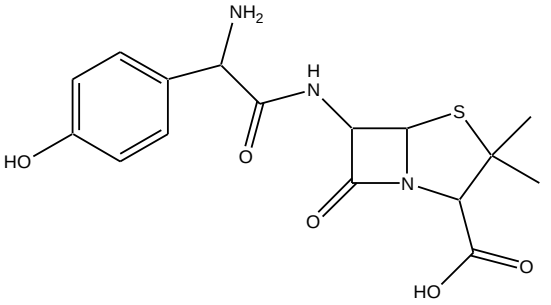
Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Hard

61. Draw all the constitutional isomers with a molecular formula of C_3H_6O and label the functional groups in each isomer.
Ans:

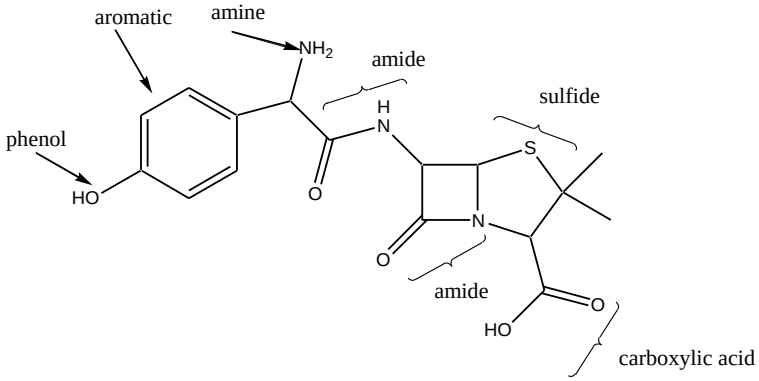


Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Hard

62. Amoxicillin, an antibiotic, has the following structure. Identify the functional groups in amoxicillin.

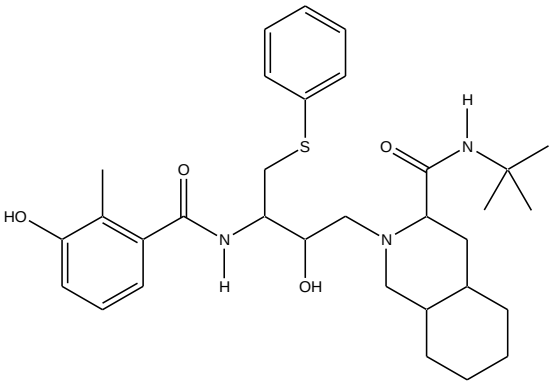


Ans:

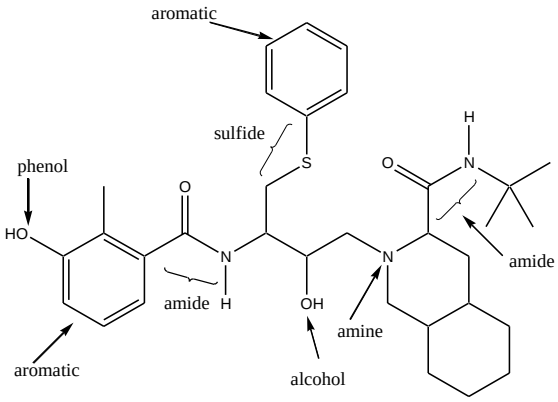


Topic: Identifying Functional Groups
Section: 2.3
Difficulty Level: Hard

63. Viracept, used in the treatment of HIV, has the following structure. Identify the functional groups in Viracept.

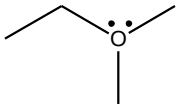


Ans:



Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

64. What is the formal charge on the oxygen atom in the following compound?

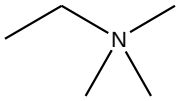


A) +1
B) +2
C) -1
D) -2
E) 0

Ans: A

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

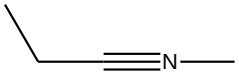
65. What is the formal charge on the nitrogen atom in the following compound?



A) -1
B) -2
C) +1
D) +2
E) 0
Ans: C

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

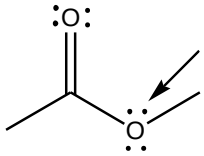
66. What is the formal charge on the nitrogen atom in the following compound?



A) +1
B) +2
C) -1
D) -2
E) 0
Ans: A

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

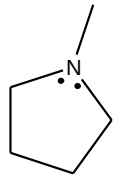
67. What is the formal charge on the indicated oxygen atom in the following compound?



A) +1
B) +2
C) -1
D) -2
E) 0
Ans: E

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

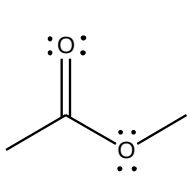
68. What is the formal charge on the nitrogen atom in the following compound?



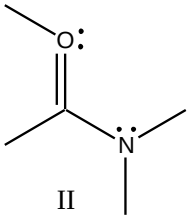
A) +1
B) +2
C) -1
D) -2
E) 0
Ans: E

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Medium

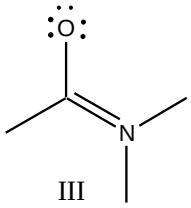
69. Which of the following compounds have +1 as a formal charge on an oxygen atom?



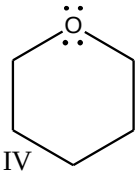
I



II



III

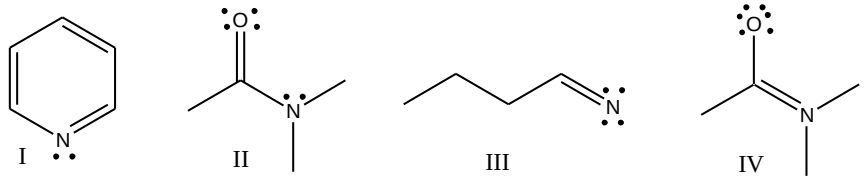


IV

A) I
B) II
C) III
D) IV
E) Both I & IV
Ans: B

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Medium

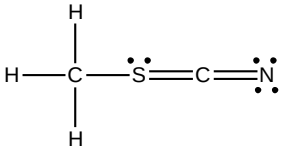
70. Which of the following compounds have +1 as a formal charge on the nitrogen atom?



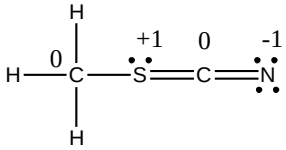
A) I
B) II
C) III
D) IV
E) Both I & II
Ans: D

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Medium

71. Determine the formal charges on each atom except hydrogen.



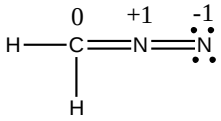
Ans:



Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Hard

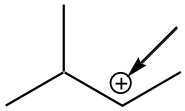
72. Diazomethane has the molecular formula CH_2N_2. Draw the preferred Lewis structure for diazomethane and assign formal charges to all atoms, if any.

Ans:



Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

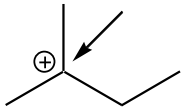
73. How many hydrogen atoms are connected to the indicated carbon atom?



A) one
B) two
C) three
D) four
E) none
Ans: A

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

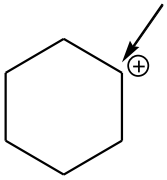
74. How many hydrogen atoms are connected to the indicated carbon atom?



A) one
B) two
C) three
D) four
E) none
Ans: E

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

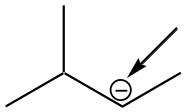
75. How many hydrogen atoms are connected to the indicated carbon atom?



A) one
B) two
C) three
D) four
E) none
Ans: A

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

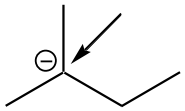
76. How many hydrogen atoms are connected to the indicated carbon atom?



A) one
B) two
C) three
D) four
E) none
Ans: A

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

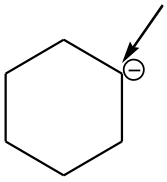
77. How many hydrogen atoms are connected to the indicated carbon atom?



A) one
B) two
C) three
D) four
E) none
Ans: E

Topic: Carbon Atoms with Formal Charges
Section: 2.4
Difficulty Level: Easy

78. How many hydrogen atoms are connected to the indicated carbon atom?

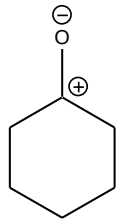


A) one
B) two
C) three
D) four
E) none
Ans: A

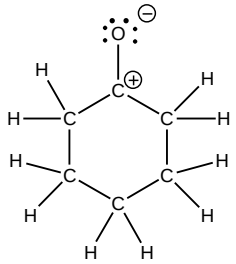
Topic: Carbon Atoms with Formal Charges
Section: 2.4

Difficulty Level: Medium

79. Draw Lewis structure for the following compound.

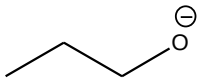


Ans:



Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Easy

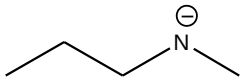
80. How many lone pairs of electrons are on the oxygen atom?



A) one
B) two
C) three
D) four
E) none
Ans: C

Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Easy

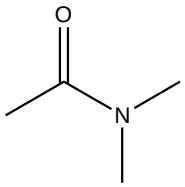
81. How many lone pairs of electrons are on the nitrogen atom?



A) one
B) two
C) three
D) four
E) none
Ans: B

Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Easy

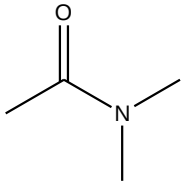
82. How many lone pairs of electrons are on the oxygen atom?



A) one
B) two
C) three
D) four
E) none
Ans: B

Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Easy

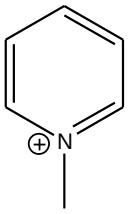
83. How many lone pairs of electrons are on the nitrogen atom?



A) one
B) two
C) three
D) four
E) none
Ans: A

Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Easy

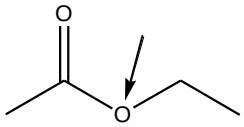
84. How many lone pairs of electrons are on the nitrogen atom?



A) one
B) two
C) three
D) four
E) none
Ans: E

Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Easy

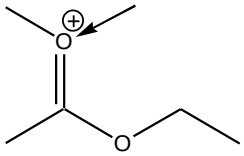
85. How many lone pairs of electrons are on the indicated oxygen atom?



A) one
B) two
C) three
D) four
E) none
Ans: B

Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Easy

86. How many lone pairs of electrons are on the indicated oxygen atom?

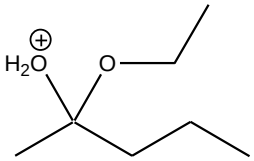


A) one
B) two
C) three
D) four
E) none
Ans: A

Topic: Identifying lone pairs

Section: 2.5
Difficulty Level: Medium

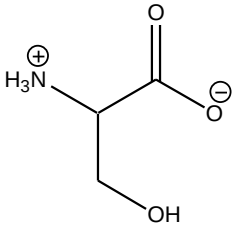
87. How many total lone pairs of electrons are on both oxygen atoms in the following compound?



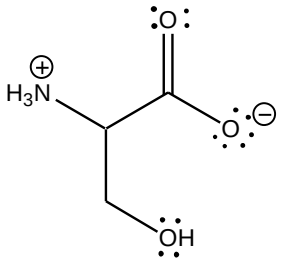
A) one
B) two
C) three
D) four
E) none
Ans: C

Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Medium

88. Draw all lone pairs of electrons for the following compound.

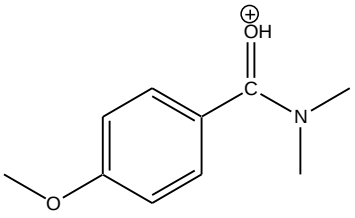


Ans:

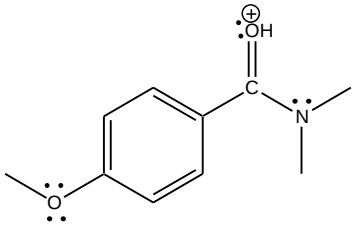


Topic: Identifying lone pairs
Section: 2.5
Difficulty Level: Medium

89. Draw all lone pairs of electrons for the following compound.

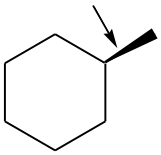


Ans:



Topic: Three-Dimensional Bond-Line Structures
Section: 2.6
Difficulty Level: Easy

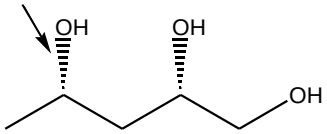
90. The indicated bond in the following compound is_____ of the paper.



A) in the plane
B) out of the plane
C) behind the plane
D) None of these
Ans: B

Topic: Three-Dimensional Bond-Line Structures
Section: 2.6
Difficulty Level: Easy

91. The indicated bond in the following compound is_____ of the paper.

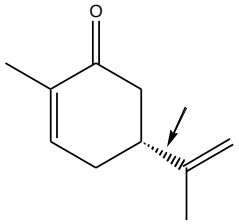


A) in the plane
B) out of the plane
C) behind the plane
D) None of these
Ans: C

Topic: Three-Dimensional Bond-Line Structures
Section: 2.6

Difficulty Level: Easy

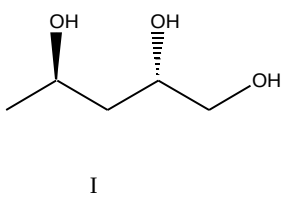
92. The indicated bond in the following compound is_____ of the paper.



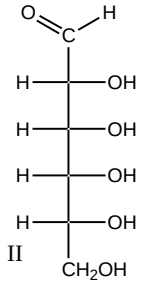
A) in the plane
B) out of the plane
C) behind the plane
D) None of these
Ans: C

Topic: Three-Dimensional Bond-Line Structures
Section: 2.6
Difficulty Level: Easy

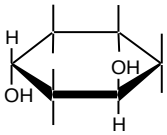
93. Which of the following is a Fischer projection?



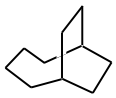
I



II



III

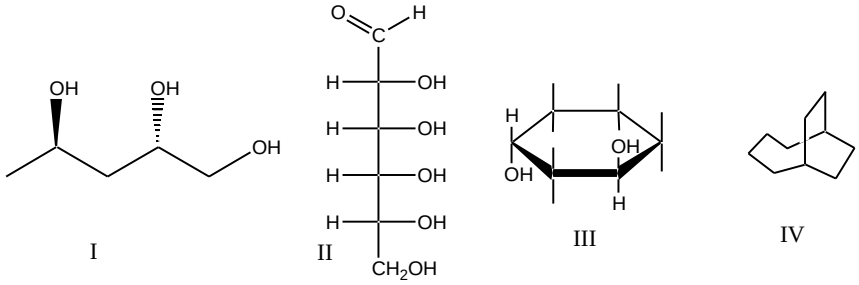


IV

A) I
B) II
C) III
D) IV
E) Both III & IV
Ans: B

Topic: Three-Dimensional Bond-Line Structures
Section: 2.6
Difficulty Level: Easy

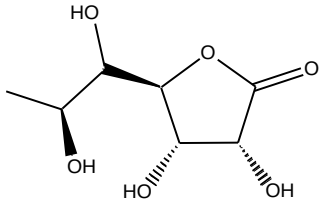
94. Which of the following is a Haworth projection?



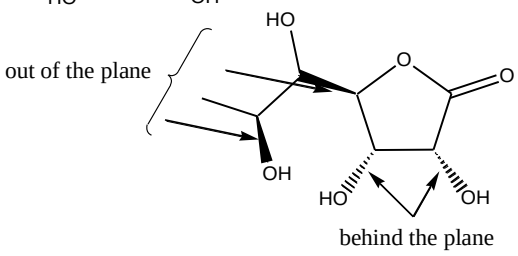
A) I
B) II
C) III
D) IV
E) Both III & IV
Ans: C

Topic: Three-Dimensional Bond-Line Structures
Section: 2.6
Difficulty Level: Medium

95. For the following compound label the bonds that are out of the plane and behind the plane of the paper.



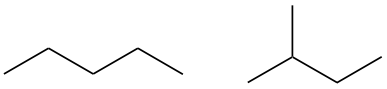
Ans:



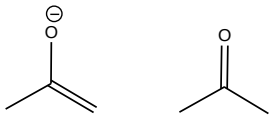
Topic: Introduction to Resonance
Section: 2.7
Difficulty Level: Easy

96. Which of the following pairs are resonance structures of each other?

I.



II.



III.

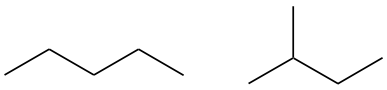
IV.

A) I
B) II
C) III
D) IV
E) None of these
Ans: D

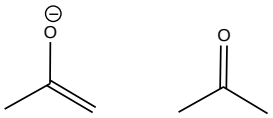
Topic: Introduction to Resonance
Section: 2.7
Difficulty Level: Easy

97. Which of the following pairs are resonance structures of each other?

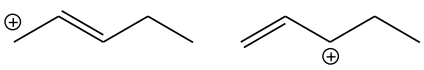
I.



II.



III.



IV.

A) I
B) II
C) III
D) IV
E) None of these
Ans: C

Topic: Introduction to Resonance
Section: 2.7
Difficulty Level: Easy

98. Spreading of positive or negative charge over two or more atoms in a compound is called_____.
A) isomerism
B) delocalization
C) stereoisomerism
D) localization
E) None of these
Ans: B

Topic: Introduction to Resonance
Section: 2.7
Difficulty Level: Easy

99. Delocalization of charge over two or more atoms _____ a molecule.
A) destabilizes
B) delocalizes
C) localizes
D) stabilizes
E) None of these
Ans: D

Topic: Introduction to Resonance
Section: 2.7
Difficulty Level: Medium

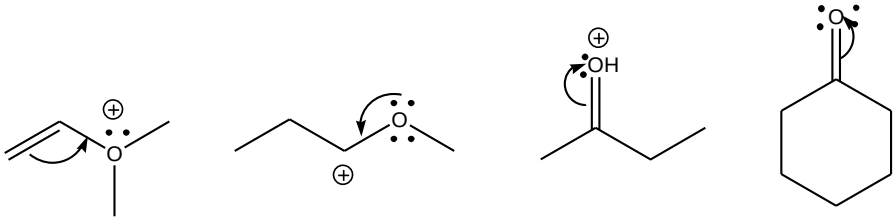
100. Resonance structures have _____ connectivity of atoms and _____ distribution of electrons.
A) different, same
B) same, same
C) different, different
D) same, different
E) None of these
Ans: D

Topic: Introduction to Resonance
Section: 2.7
Difficulty Level: Medium

101. What is a resonance hybrid?
Ans: A molecule that can be represented by drawing two or more resonance structures is viewed as resonance hybrid.

Topic: Curved Arrows
Section: 2.8
Difficulty Level: Easy

102. Which of the following violates the rules for curved arrows?

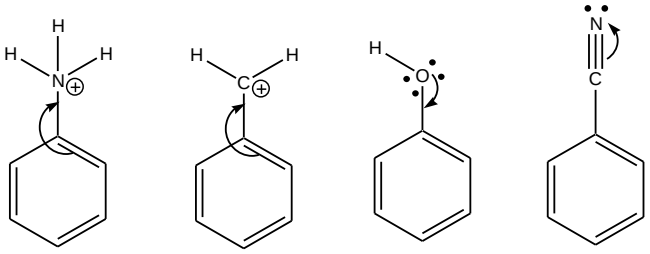


I II III IV

A) I
B) II
C) III
D) IV
E) None of these
Ans: A

Topic: Curved Arrows
Section: 2.8
Difficulty Level: Easy

103. Which of the following violates the rules for curved arrows?

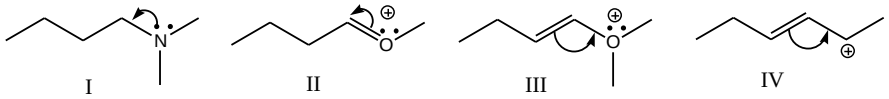


I II III IV

A) I
B) II & IV
C) I & III
D) III & IV
E) None of these
Ans: C

Topic: Curved Arrows
Section: 2.8
Difficulty Level: Easy

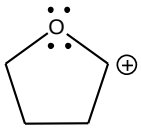
104. Which of the following violates the rules for curved arrows?



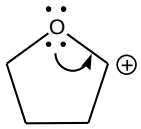
A) I & II
B) III & IV
C) I, II & III
D) II, III & IV
E) All of these
Ans: C

Topic: Curved Arrows
Section: 2.8
Difficulty Level: Medium

105. Provide the curved arrow(s) to draw a resonance structure for the following compound.

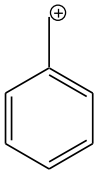


Ans:

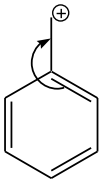


Topic: Curved Arrows
Section: 2.8
Difficulty Level: Medium

106. Provide the curved arrow(s) to draw a resonance structure for the following compound.

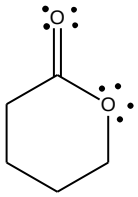


Ans:

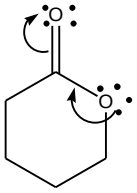


Topic: Curved Arrows
Section: 2.8
Difficulty Level: Hard

107. Provide the curved arrow(s) to draw a resonance structure for the following compound.

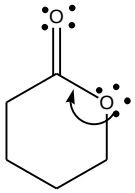


Ans:

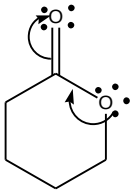


Topic: Curved Arrows
Section: 2.8
Difficulty Level: Hard

108. Explain using words as well as structural drawings, if the single curved arrow shown is sufficient to draw the resonance structure.

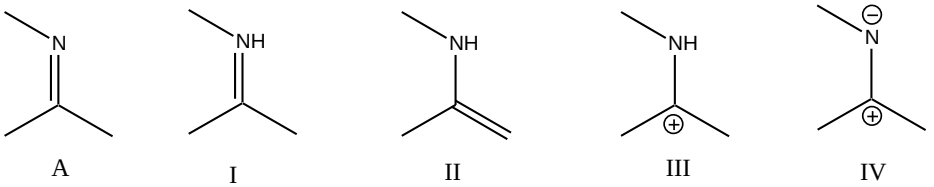


Ans: The single arrow shown will violate the octet rule. Drawing another curved arrow will remove the violation.



Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Easy

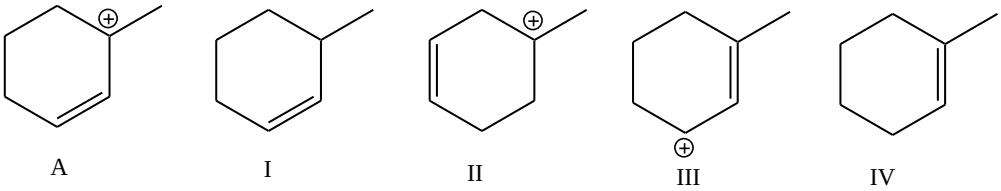
109. Which of the following is a correct resonance structure for compound A?



A) I
B) II
C) III
D) IV
E) none of these
Ans: D

Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Easy

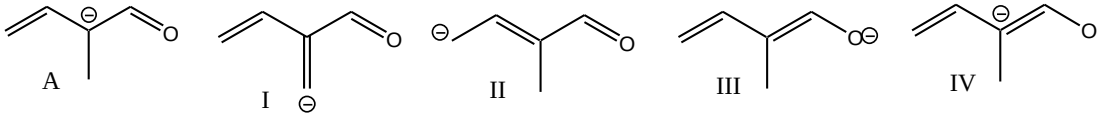
110. Which of the following is a correct resonance structure for compound A?



A) I
B) II
C) III
D) IV
E) None of these
Ans: C

Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Medium

111. Which of the following is/are correct resonance structure(s) for compound A?

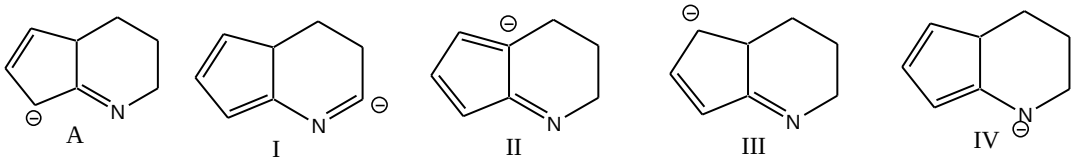


A) I
B) II & III
C) III & IV
D) I & III
E) I & IV
Ans: B

Topic: Formal Charges in Resonance Structures

Section: 2.9
Difficulty Level: Medium

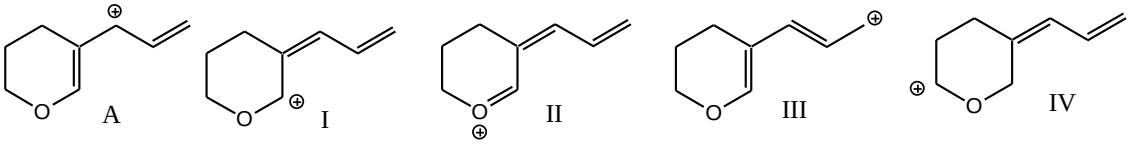
112. Which of the following is/are correct resonance structure(s) for compound A



A) I & II
B) II & III
C) III & IV
D) I & III
E) I & IV
Ans: C

Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Medium

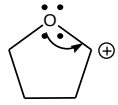
113. Which of the following is/are correct resonance structure(s) for compound A?



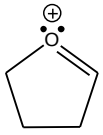
A) I & II
B) II & III
C) III & IV
D) I, II & III
E) I & IV
Ans: D

Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Easy

114. Draw the resonance structure indicated by the curved arrows.



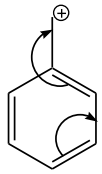
Ans:



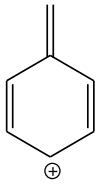
Topic: Formal Charges in Resonance Structures
Section: 2.9

Difficulty Level: Easy

115. Draw the resonance structure indicated by the curved arrows.

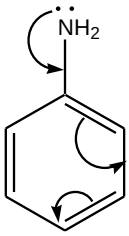


Ans:

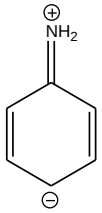


Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Medium

116. Draw the resonance structure indicated by the curved arrows.

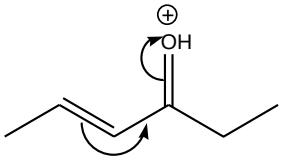


Ans:

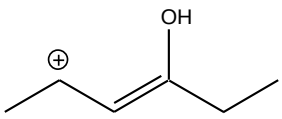


Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Medium

117. Draw the resonance structure indicated by the curved arrows.



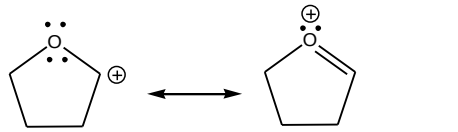
Ans:



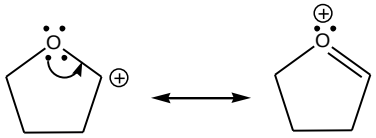
Topic: Formal Charges in Resonance Structures

Section: 2.9
Difficulty Level: Medium

118. Draw the curved arrow(s) for converting the first resonance structure into the second resonance structure.

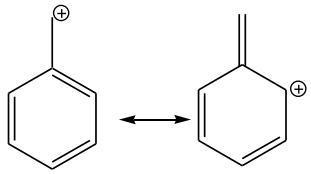


Ans:

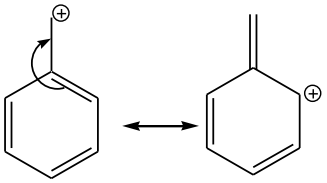


Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Medium

119. Draw the curved arrow(s) for converting the first resonance structure into the second resonance structure.

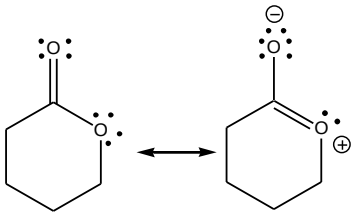


Ans:

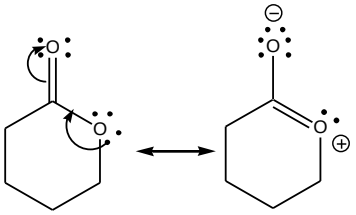


Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Hard

120. Draw the curved arrow(s) for converting the first resonance structure into the second resonance structure.

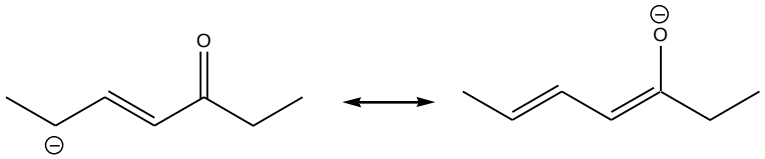


Ans:

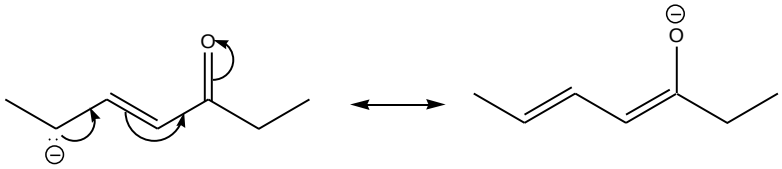


Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Hard

121. Draw the curved arrow(s) for converting the first resonance structure into the second resonance structure.

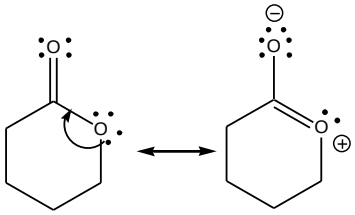


Ans:

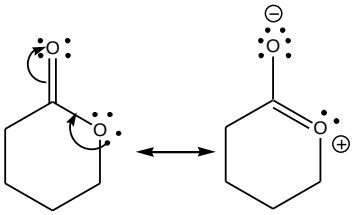


Topic: Formal Charges in Resonance Structures
Section: 2.9
Difficulty Level: Hard

122. Explain using words as well as structural drawings, if the single curved arrow shown is sufficient for the following resonance structures?

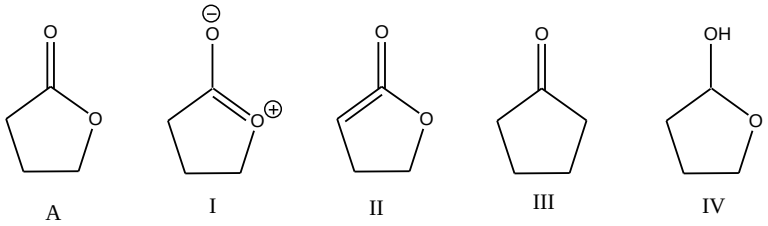


Ans: The single arrow shown will violate the octet rule. Drawing another curved arrow will remove the violation.



Topic: Pattern Recognition
Section: 2.10
Difficulty Level: Easy

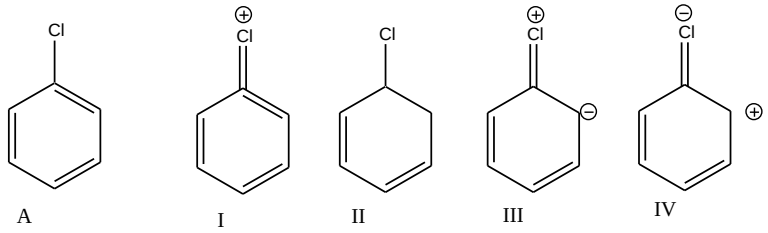
123. Which of the following is a correct resonance structure for compound A



A) I
B) II
C) III
D) IV
E) None of these
Ans: A

Topic: Pattern Recognition
Section: 2.10
Difficulty Level: Easy

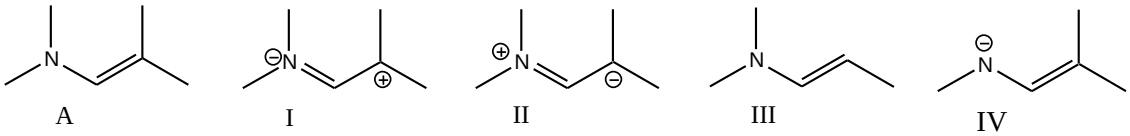
124. Which of the following is a correct resonance structure for compound A?



A) I
B) II
C) III
D) IV
E) None of these
Ans: C

Topic: Pattern Recognition
Section: 2.10
Difficulty Level: Easy

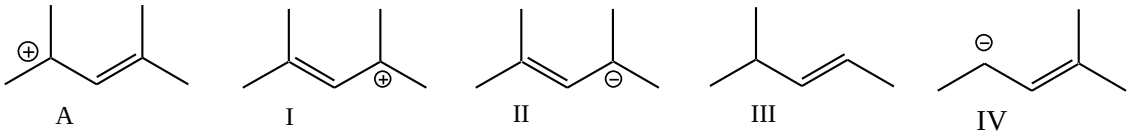
125. Which of the following is a correct resonance structure for compound A?



A) I
B) II
C) III
D) IV
E) None of these
Ans: B

Topic: Pattern Recognition
Section: 2.10
Difficulty Level: Easy

126. Which of the following is a correct resonance structure for compound A?

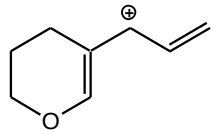


A) I
B) II
C) III
D) IV
E) None of these
Ans: A

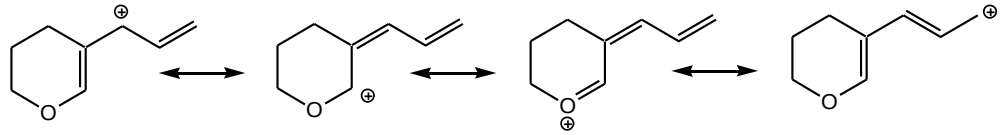
Topic: Pattern Recognition

Section: 2.10
Difficulty Level: Medium

127. Draw resonance structures for the following compound.

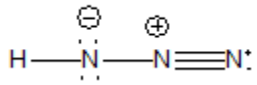


Ans:

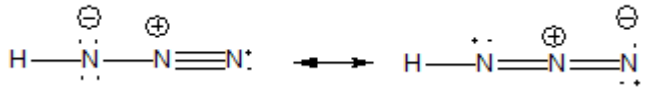


Topic: Pattern Recognition
Section: 2.10
Difficulty Level: Hard

128. Draw two additional resonance structures for the following compound.

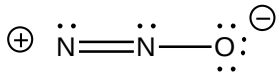


Ans:

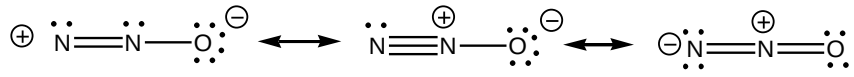


Topic: Pattern Recognition
Section: 2.10
Difficulty Level: Hard

129. Draw two additional resonance structures for the following compound.

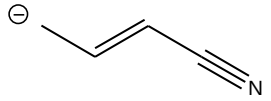


Ans:

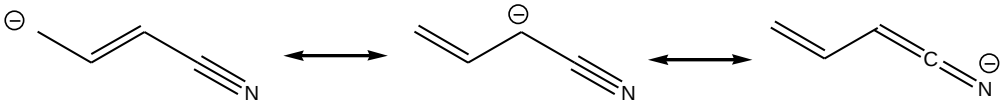


Topic: Pattern Recognition
Section: 2.10
Difficulty Level: Hard

130. Draw two additional resonance structures for the following compound.

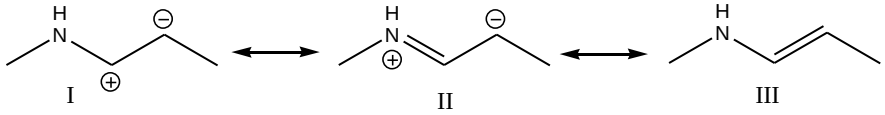


Ans:



Topic: Assessing Importance
Section: 2.11
Difficulty Level: Easy

131. Which of the following is/are the most significant resonance structure(s)?

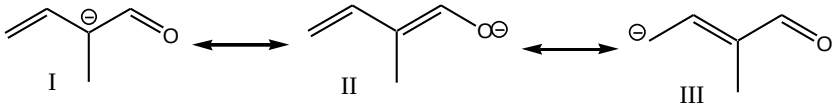


I II III

A) I
B) II
C) III
D) II & III
E) all of these
Ans: C

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Easy

132. Which of the following is/are the most significant resonance structure(s)?

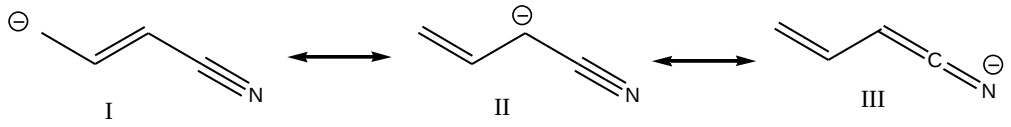


I II III

A) I
B) II
C) III
D) I & II
E) all of these
Ans: B

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Easy

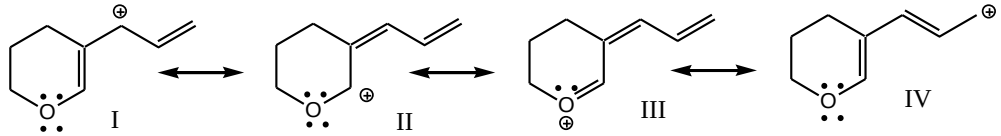
133. Which of the following is/are the most significant resonance structure(s)?



A) I
B) II
C) III
D) I & II
E) all of these
Ans: C

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Medium

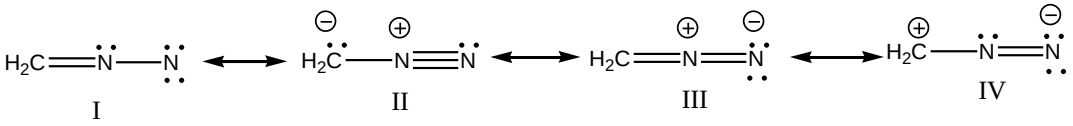
134. Which of the following is/are the most significant resonance structure(s)?



A) I
B) II
C) III
D) I & II
E) I & IV
Ans: C

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Medium

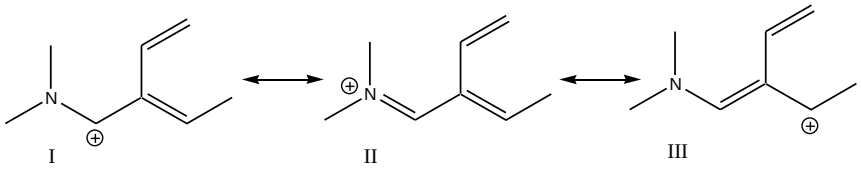
135. Which of the following is the most significant resonance structure?



A) I
B) II
C) III
D) IV
E) None of these
Ans: C

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Medium

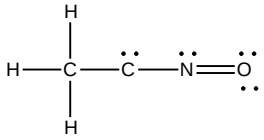
136. Which of the following is/are the most significant resonance structure(s)?



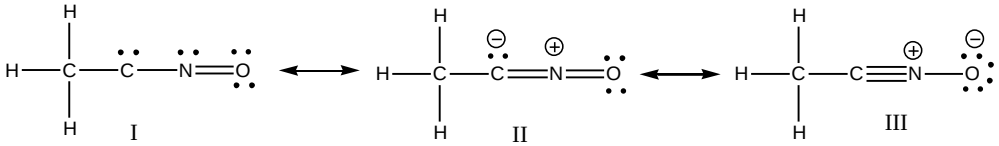
A) I
B) II
C) III
D) I & III
E) all of these
Ans: B

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Hard

137. Draw significant resonance structures for the following compound. Which of this is/are most significant resonance structure(s)? Explain why.



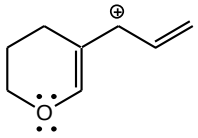
Ans:



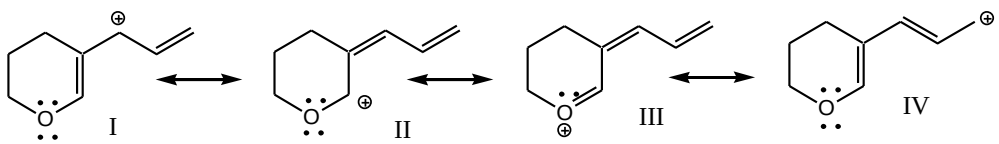
Resonance structure III is most significant, because the more electronegative oxygen atom carries a negative formal charge.

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Hard

138. Draw significant resonance structures for the following compound. Which of this is/are most significant resonance structure(s)? Explain why.



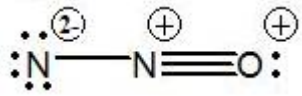
Ans:



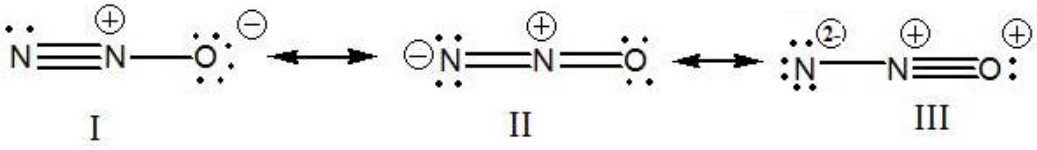
Resonance structure III is most significant, because all atoms have octet of electrons.

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Hard

139. Draw significant resonance structures for the following compound. Which of this is/are most significant resonance structure(s)? Explain why.



Ans:

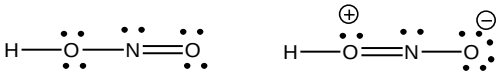


I II III

Resonance structure I is most significant, because the more electronegative oxygen atom carries a negative formal charge.

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Easy

140. What is the relationship between the following compounds?



A) Constitutional isomers
B) Resonance structures
C) conformers
D) Identical compounds
Ans: B

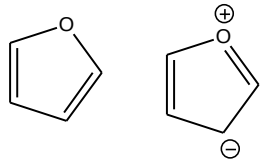
Topic: Assessing Importance
Section: 2.11
Difficulty Level: Easy

141. What is the relationship between the following compounds?

A) Constitutional isomers
B) Resonance structures
C) conformers
D) Identical compounds
E) Different compounds
Ans: A

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Easy

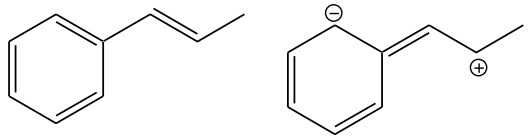
142. What is the relationship between the following compounds?



A) Constitutional isomers
B) Resonance structures
C) conformers
D) Identical compounds
E) Different compounds
Ans: B

Topic: Assessing Importance
Section: 2.11
Difficulty Level: Easy

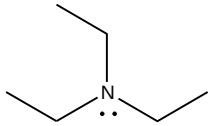
143. What is the relationship between the following compounds?



A) Constitutional isomers
B) Resonance structures
C) conformers
D) Identical compounds
E) Different compounds
Ans: B

Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Easy

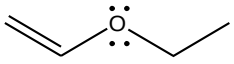
144. The lone pair on nitrogen in the following compound is _____.



A) localized
B) delocalized
Ans: A

Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Easy

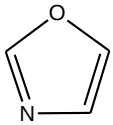
145. The lone pair on oxygen in the following compound is _____.



A) localized
B) delocalized
Ans: B

Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Easy

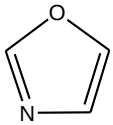
146. The lone pair on nitrogen in the following compound is _____.



A) localized
B) delocalized
Ans: A

Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Easy

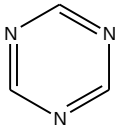
147. The lone pairs on oxygen in the following compound are _____.



A) both localized
B) both delocalized
C) one localized
D) one delocalized
E) Both C & D
Ans: E

Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Easy

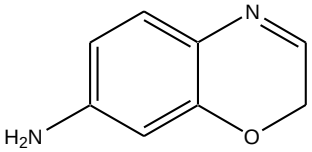
148. The lone pair on nitrogen in the following compound is _____.



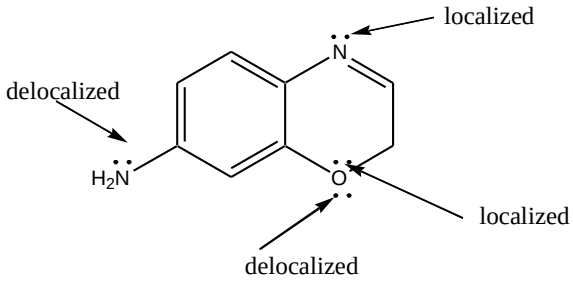
A) localized
B) delocalized
Ans: A

Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Medium

149. For the following compound identify the lone pairs and indicate if each lone pair is localized or delocalized.

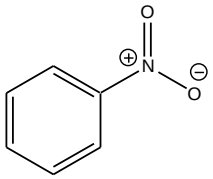


Ans:

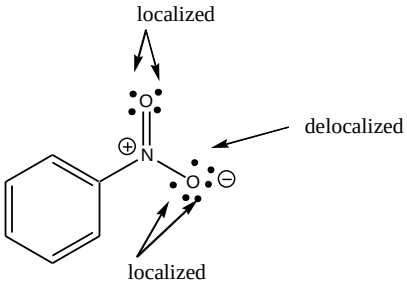


Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Medium

150. For the following compound identify the lone pairs and indicate if each lone pair is localized or delocalized.

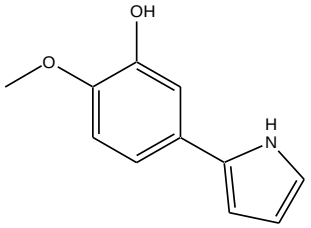


Ans:

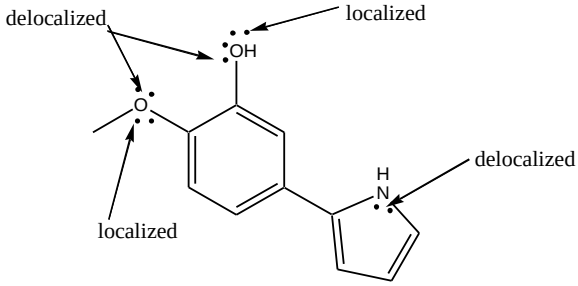


Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Medium

151. For the following compound identify the lone pairs and indicate if each lone pair is localized or delocalized.

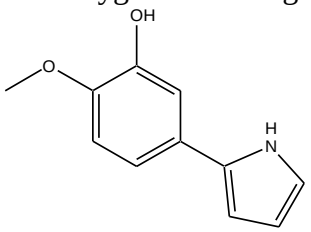


Ans:

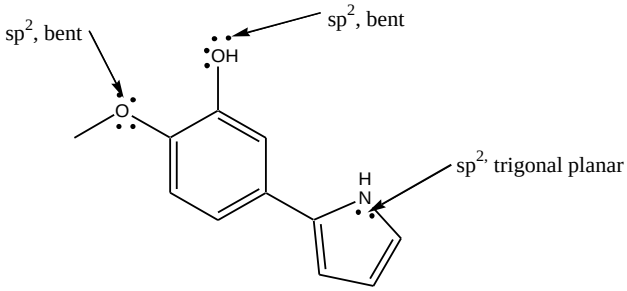


Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Hard

152. For the following compound what is the hybridization state and molecular geometry at each oxygen and nitrogen atom

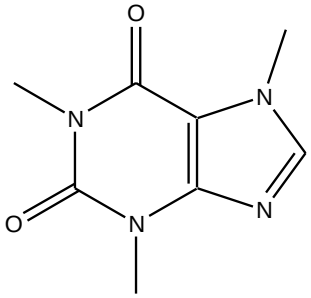


Ans:

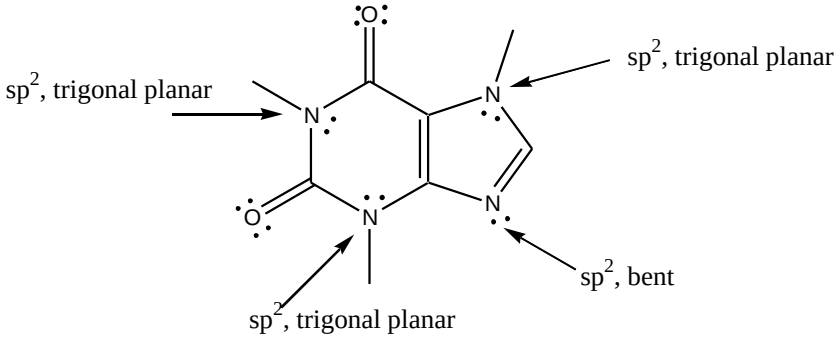


Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Hard

153. Caffeine has the following structure. What is the hybridization state and molecular geometry at each nitrogen atom in Caffeine?

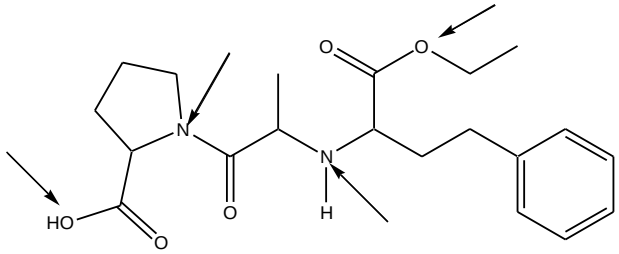


Ans:



Topic: Delocalized and Localized Lone Pairs
Section: 2.12
Difficulty Level: Hard

154. Enalapril, is a drug used in the treatment of heart disease. What is the hybridization state and molecular geometry at the indicated atoms in enalapril?



Ans: