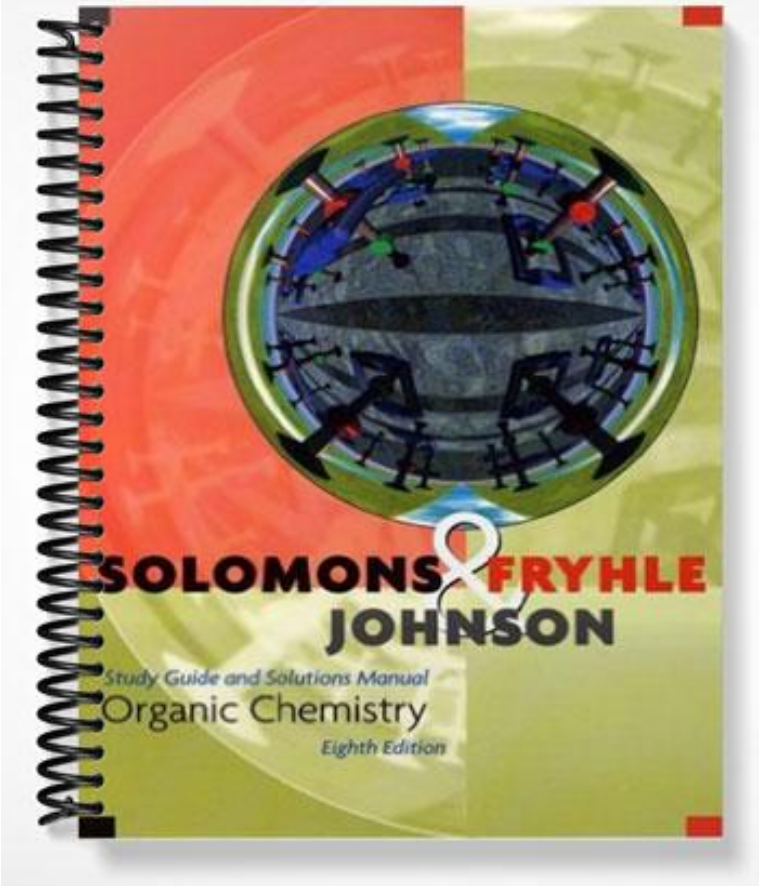
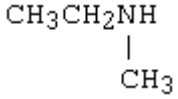
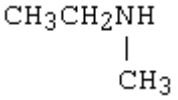
TEST BANK

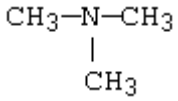

SOLOMONS & FRYHLE
JOHNSON
Study Guide and Solutions Manual
Organic Chemistry
Eighth Edition

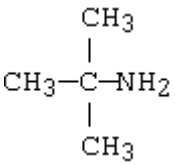
1. Which compound would you expect to have the lowest boiling point?

A) $CH_3CH_2CH_2NH_2$

B) 

C) 

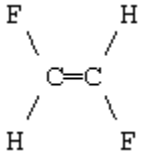
D) 

E) 

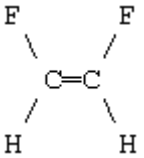
Ans: D

2. Which molecule would you expect to have no dipole moment (i.e., $\mu = 0$ D)?

A) CHF_3

B) 

C) $:NF_3$

D) 

E) CH_2F_2

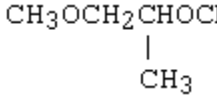
Ans: B

3. Which of these compounds would have the highest boiling point?

A) $CH_3OCH_2CH_2CH_2OCH_3$

B) $CH_3CH_2OCH_2CH_2OCH_3$

C) $CH_3CH_2OCH_2OCH_2CH_3$

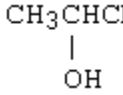
D) 

E) $HOCH_2CH_2CH_2CH_2CH_2OH$

Ans: E

4. Which of these would you expect to have the lowest boiling point?

A) $CH_3CH_2CH_2OH$

B) 

C) $CH_3OCH_2CH_3$

D) $CH_3CH_2CH_2CH_2OH$

E) $CH_3CH_2OCH_2CH_3$

Ans: C

5. Which compound would have the highest boiling point?

A) $CH_3CH_2CH_2CH_2CH_2CH_3$

B) $CH_3CH_2OCH_2CH_2CH_3$

C) $CH_3CH_2CH_2CH_2CH_2OH$

D) $CH_3CH_2OCH(CH_3)_2$

E) $CH_3OCH_2CH_2CH_2CH_3$

Ans: C

6. Which is not an intermolecular attractive force?

A) Ion-ion

B) van der Waals

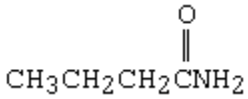
C) Dipole-dipole

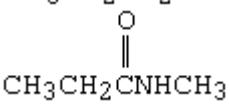
D) Resonance

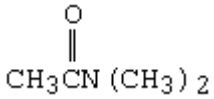
E) Hydrogen bonding

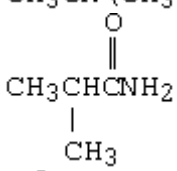
Ans: D

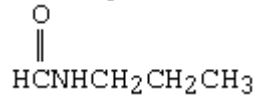
7. Which compound would you expect to have the lowest boiling point?

A) 

B) 

C) 

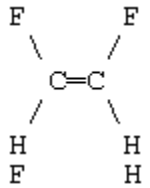
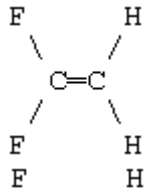
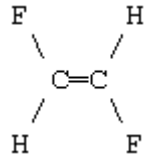
D) 

E) 

Ans: C

8. Which compound would you expect to have the highest boiling point?
A) $CH_3OCH_2CH_2OCH_3$
B) $CH_3OCH_2OCH_2CH_3$
C) $HOCH_2CH_2CH_2CH_2OH$
D) $CH_3OCH_2CH_2CH_2OH$
E) $(CH_3O)_2CHCH_3$
Ans: C

9. Which of the following would have no net dipole moment ($\mu = 0$ D)?
A) CBr_4
B) cis-1,2-Dibromoethene
C) trans-1,2-Dibromoethene
D) 1,1-Dibromoethene
E) More than one of these
Ans: E

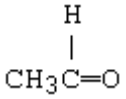
10. Which molecule has dipole moment greater than zero?
A)

B)

C)

D) More than one of these
E) None of these
Ans: D

11. The strongest of attractive forces is which type?
A) van der Waals
B) Ion-dipole
C) Dipole-dipole
D) Cation-anion
E) Hydrogen bonds
Ans: D

12. Of the following compounds, the one with the highest boiling point is:

A) CH_3CH_3

B) CH_3CH_2Cl

C) 

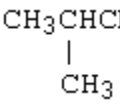
D) CH_3CH_2OH

E) $CH_3CH_2OCH_2CH_3$

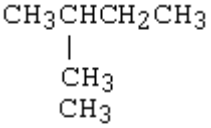
Ans: D

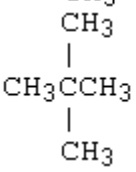
13. This alkane is predicted to have the highest melting point of those shown:

A) $CH_3CH_2CH_2CH_3$

B) 

C) $CH_3CH_2CH_2CH_2CH_3$

D) 

E) 

Ans: E

14. The solid alkane $CH_3(CH_2)_{18}CH_3$ is expected to exhibit the greatest solubility in which of the following solvents?

A) CCl_4

B) CH_3OH

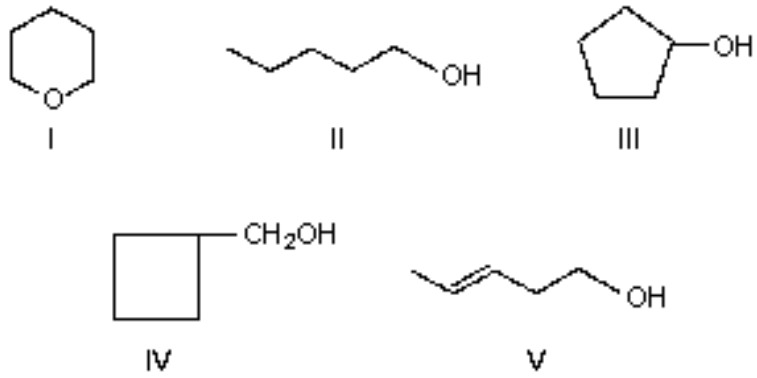
C) H_2O

D) CH_3NH_2

E) $HOCH_2CH_2OH$

Ans: A

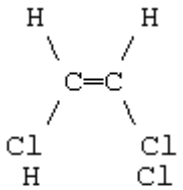
15. Which compound would have the lowest boiling point?

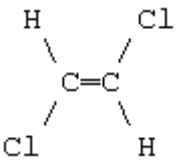


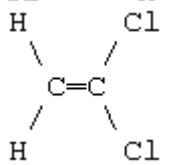
I II III IV V

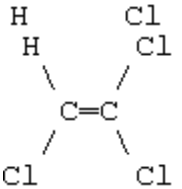
A) I
B) II
C) III
D) IV
E) V
Ans: A

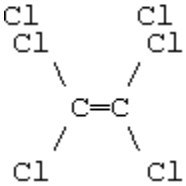
16. Which of these chlorinated ethenes has the largest dipole moment?

A)


B)


C)


D)


E)


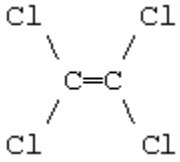
AAns:

17. Which molecule has a zero dipole moment?
A) SO_2
B) CO_2
C) CO
D) $CHCl_3$
E) None of these
Ans: B

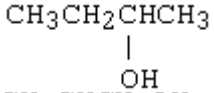
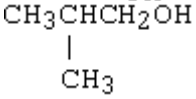
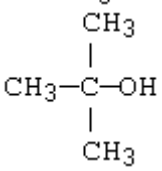
18. Which molecule has a zero dipole moment?
A) CH_3Cl
B) CH_2Cl_2
C) $CHCl_3$
D) CCl_4
E) None of these
Ans: D

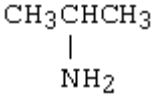
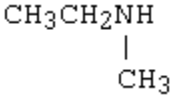
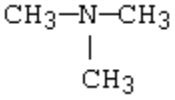
19. Which molecule would have a dipole moment greater than zero?
A) $BeCl_2$
B) BCl_3
C) CO_2
D) H_2O
E) CCl_4
Ans: D

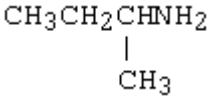
20. For a molecule to possess a dipole moment, the following condition is necessary but not sufficient.
A) Three or more atoms in the molecule
B) Presence of one or more polar bonds
C) A non-linear structure
D) Presence of oxygen or fluorine
E) Absence of a carbon-carbon double or triple bond
Ans: B

21. A non-zero dipole moment is exhibited by:
A) SO_2
B) CO_2
C) CCl_4
D) BF_3
E) 
Ans: A

22. Which of these is the weakest of the intermolecular attractive force?
A) Ion-ion
B) van der Waals
C) Dipole-dipole
D) Covalent bonding
E) Hydrogen bonding
Ans: B

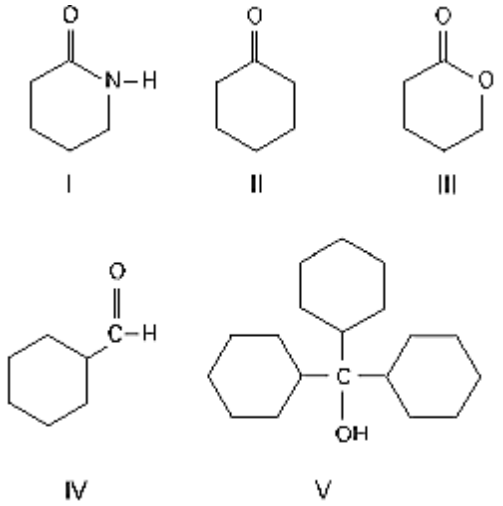
23. Which compound listed below is a secondary alcohol?
A) 
B) 
C) 
D) $CH_3CH_2CH_2CH_2OH$
E) $CH_3CH_2CH_2OCH_3$
Ans: A

24. Which compound is a secondary amine?
A) CH3CH2CH2NH2
B) 
C) 
D) 

E) 

Ans: C

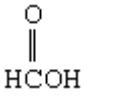
25. Which compound is an aldehyde?

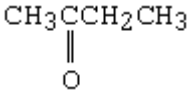


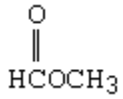
A) I
B) II
C) III
D) IV
E) V

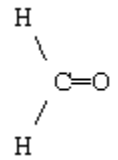
Ans: D

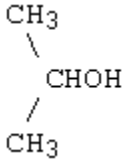
26. Which compound is a ketone?

A) 

B) 

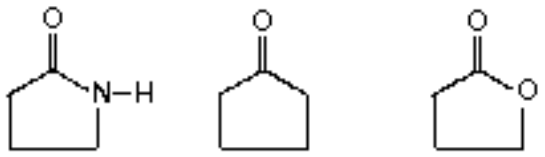
C) 

D) 

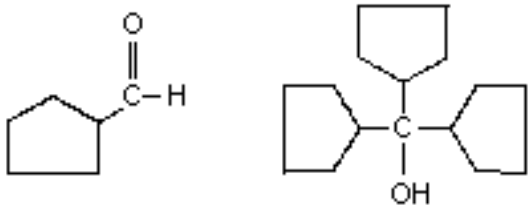
E) 

Ans: B

27. Which compound is an ester?



I II III

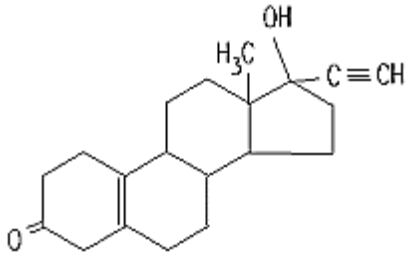


IV V

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

CAns:

28. The compound shown below is a synthetic estrogen. It is marketed as an oral contraceptive under the name Enovid.



In addition to an alkane (actually cycloalkane) skeleton, the Enovid molecule also contains the following functional groups:

A) Ether, alcohol, alkyne.
B) Aldehyde, alkene, alkyne, alcohol.
C) Alcohol, carboxylic acid, alkene, alkyne.
D) Ketone, alkene, alcohol, alkyne.
E) Amine, alkene, ether, alkyne.

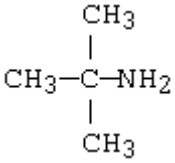
Ans: D

29. Which is a 3° alkyl halide?

A) $CH_3C(Cl)(CH_3)CH_3$
B) $CH_3CCH_2Cl(CH_3)CH_3$
C) $CH_3CH_2CH(Cl)CH_3$
D) $CH_3CH_2CH_2CH_2Cl$
E) $ClCH(CH_3)CH_2CH_3$

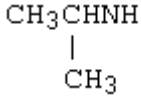
Ans: A

30. Which is a 3° amine?

A) 

B) $CH_3CH_2CH_2NH_2$

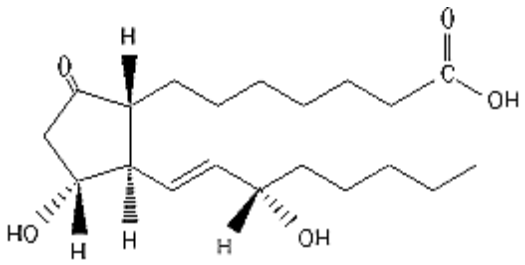
C) $CH_3CH_2N(CH_3)_2$

D) 

E) $(CH_3)_3CNHCH_3$

Ans: C

31. Which functional group is not contained in prostaglandin E_1?



Prostaglandin E_1

A) Ketone

B) 2° alcohol

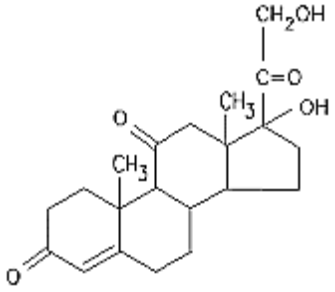
C) 3° alcohol

D) Carboxylic acid

E) Alkene

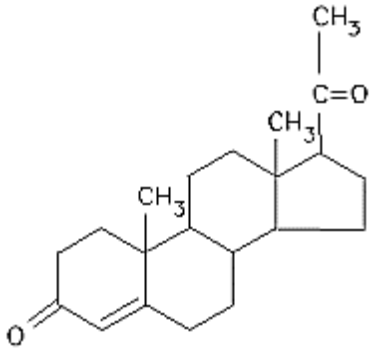
Ans: C

32. The compound below is an adrenocortical hormone called cortisone. Which functional group is not present in cortisone?



A) 1° alcohol
B) 2° alcohol
C) 3° alcohol
D) Ketone
E) Alkene
Ans: B

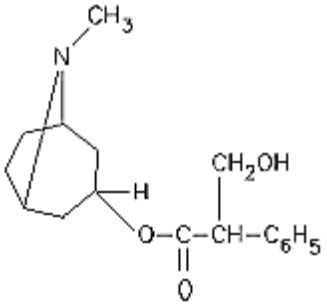
33. The compound shown below is a steroid called progesterone.



In addition to the cycloalkane skeleton, the progesterone molecule contains which other functional groups?

A) Alkene and ketone
B) Alkene, ketone, and ether
C) Aldehyde, alkene, and ketone
D) Ester, alkene, and ketone
E) Ether, ester, and alkyne
Ans: A

34. Drawn below is atropine.

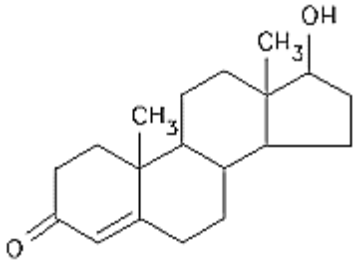


Which of the following functional groups is NOT in atropine?

A) Amine
B) Ester
C) Alcohol
D) Benzene ring
E) Ketone

Ans: E

35. The compound shown below is the male sex hormone, testosterone.

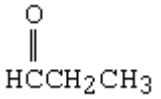


In addition to a cycloalkane skeleton, testosterone also contains the following functional groups:

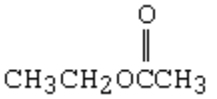
A) Alkene, ester, tertiary alcohol.
B) Alkene, ether, secondary alcohol.
C) Alkene, ketone, secondary alcohol.
D) Alkyne, ketone, secondary alcohol.
E) Alkene, ketone, tertiary alcohol.

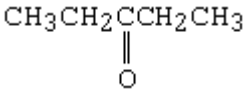
Ans: C

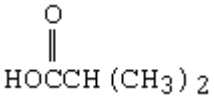
36. Which is a carboxylic acid?

A) 

B) $HOCH_2CH_2CH_3$

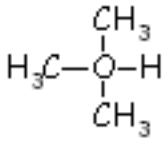
C) 

D) 

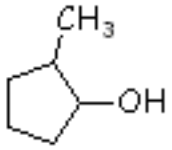
E) 

Ans: E

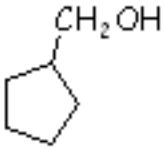
37. Which compound is a tertiary alcohol?



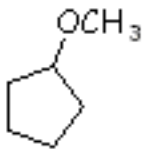
I



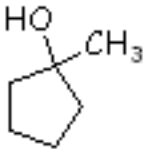
II



III



IV

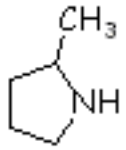


V

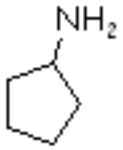
A) I
B) II
C) III
D) IV
E) V

Ans: E

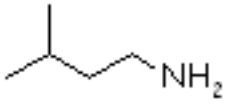
38. Which compound is a primary amine with the formula $C_5H_{13}N$?



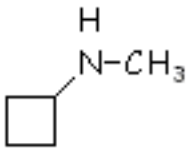
I



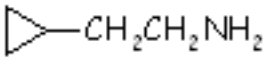
II



III

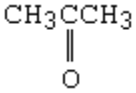


IV



V

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

39. Which compound is an alcohol?
A) CH_3CONH_2
B) 

C) $CH_3CO_2CH_2CH_3$
D) CH_3CHO
E) $(CH_3)_3COH$
Ans: E

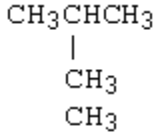
40. The C–O–C bond angle in diethyl ether is predicted to be approximately:
A) 90º
B) 105º
C) 110º
D) 120º
E) 180º
Ans: B

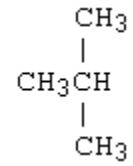
41. Which compound contains a secondary carbon atom?

A) CH_4

B) CH_3CH_3

C) $CH_3CH_2CH_3$

D) 

E) 

Ans: C

42. The number of unique monochloro derivatives of propene is:

A) 2

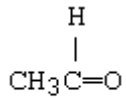
B) 3

C) 4

D) 5

E) 6

Ans: C

43. 

The carbon-carbon bond in  results from the overlap of which orbitals (in the order C_1, C_2)?

A) $sp–sp^2$

B) $sp–sp^3$

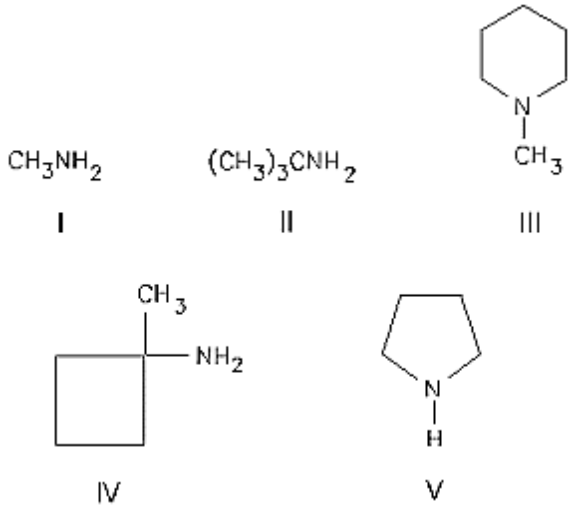
C) $sp^2–sp^2$

D) $sp^2–sp^3$

E) $sp^3–sp^3$

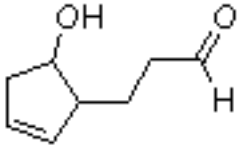
Ans: D

44. An example of a tertiary amine is:



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

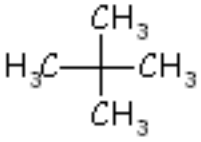
45. Which functional groups are present in the following compound?



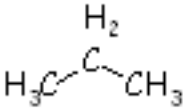
A) Alkene, 1º alcohol, ketone
B) Alkene, 2º alcohol, aldehyde
C) Alkene, 2º alcohol, ketone
D) Alkyne, 1º alcohol, aldehyde
E) Alkyne, 2º alcohol, ketone
Ans: B

46. How many constitutional isomers are possible with the formula $C_4H_{10}O$?
A) 3
B) 4
C) 5
D) 6
E) 7
Ans: E

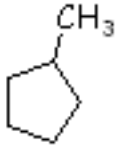
47. A tertiary carbon atom is present in which of these compounds?



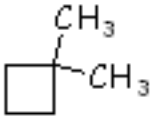
I



II

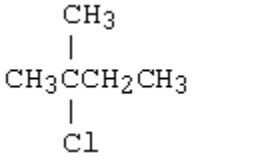
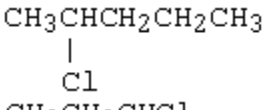
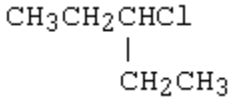


III



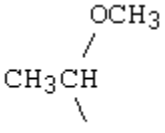
IV

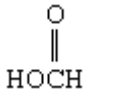
A) I
B) II
C) III
D) IV
E) None of these
Ans: C

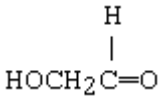
48. Which of these compounds is a secondary alkyl chloride?
A) $CH_3CH_2CH_2CH_2CH_2Cl$
B)

C)

D)

E) Two of these
Ans: E

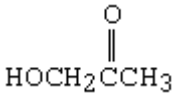
49. How many 2º alkyl bromides, neglecting stereoisomers, exist with the formula $C_6H_{13}Br$?
A) 4
B) 5
C) 6
D) 7
E) 8
Ans: C

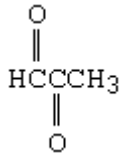
50. Many organic compounds contain more than one functional group. Which of the following is both an alcohol and a ketone?

A) 

B) 

C) 

D) 

E) 

Ans: D

51. An oxygen-containing compound which shows no IR absorption at 1630-1780 cm^{-1} or at 3200-3550 cm^{-1} is likely to be what type of compound?

A) An alcohol
B) A carboxylic acid
C) An ether
D) A ketone
E) An aldehyde

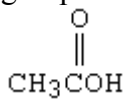
Ans: C

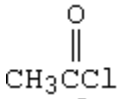
52. The absorption band for the O-H stretch in the IR spectrum of an alcohol is sharp and narrow in the case of:

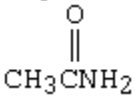
A) a Nujol mull of the alcohol.
B) a concentrated solution of the alcohol.
C) a gas phase spectrum of the alcohol.
D) the spectrum of the neat liquid.
E) none of these.

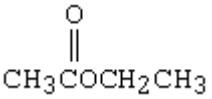
Ans: C

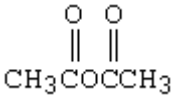
53. A split peak for the IR absorption due to bond stretching is observed for the carbonyl group in which of these compounds?

A) 

B) 

C) 

D) 

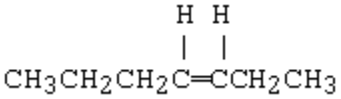
E) 

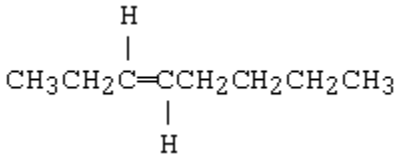
Ans: E

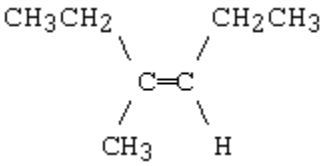
54. The IR stretching frequency occurs at the lowest frequency for which of these bonds?
A) C–H
B) C–O
C) C–Br
D) C–N
E) C–F
Ans: C

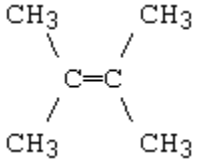
55. An anticipated IR absorption band may not be observed because:
A) it occurs outside the range of the instrument used.
B) no change occurs in the dipole moment during the vibration.
C) the absorption band is eclipsed by another.
D) the intensity is so weak that it cannot be differentiated from instrument noise.
E) All of these
Ans: E

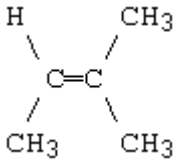
56. IR evidence for the presence of the C=C would be most difficult to detect in the case of which of these alkenes?

A) 

B) 

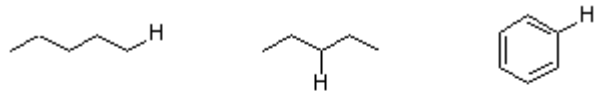
C) 

D) 

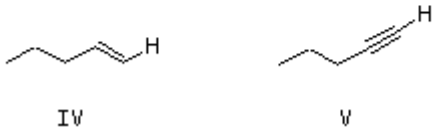
E) 

Ans: D

57. The IR absorption due to the stretching of which of these carbon-hydrogen bonds occurs at the highest frequency?



I II III



IV V

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

Ans: E

58. The IR spectrum of which type of compound will not show evidence of hydrogen bonding?
A) Aldehyde
B) Alcohol
C) Carboxylic acid
D) Phenol
E) Primary amine
Ans: A

59. The IR spectrum of which type of compound generally exhibits evidence of hydrogen bonding?
A) Aldehyde
B) Carboxylic acid
C) Alkene
D) Ester
E) Ketone
Ans: B

60. Hydrocarbons containing carbon-carbon double bonds are referred to as _____.
Ans: alkenes

61. Atoms that form covalent bonds and have unshared electron pairs are called _____.
Ans: heteroatoms

62. A group in which a carbon atom has a double bond to an oxygen atom is called a _____.
Ans: carbonyl

63. An IR spectrum has significant peaks at 3080 and 1650 cm^{-1}. What functional group is present in the molecule?
Ans: an alkene

64. An IR spectrum has significant peaks at 2800 and 1730 cm^{-1}. What functional group is present in the molecule?
Ans: an aldehyde

65. The six p-electrons in benzene are _____ about the ring, which explains why all of the C-C bonds are the same length.
Ans: delocalized

66. One definition of electronegativity is the ability of an element to _____.
Ans: attract electrons [being shared in a covalent bond]

67. A polar covalent bond is one in which electrons are _____.
Ans: not shared equally

68. Molecules of compounds in a particular family are characterized by the presence of certain arrangements of atoms known as _____.
Ans: a functional group

69. Hydrocarbons containing all single bonds are referred to as _____ compounds.
Ans: saturated