

Organic Chemistry Questions

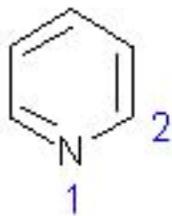
The Covalent Bond

1. The hybridization of the central carbon in $\text{CH}_3\text{C}\equiv\text{N}$ and the bond angle CCN are
 - a. sp^2 , 180° .
 - b. sp , 180° .
 - c. sp^2 , 120° .
 - d. sp^3 , 109° .
2. Which of the following statements about an sp hybridized carbon is FALSE?
 - a. It is divalent.
 - b. It forms bonds that are linear.
 - c. It has two p orbitals.
 - d. It always forms triple bonds to carbon.
3. Which molecule has the largest dipole moment?
 - a. HCl
 - b. CCl_4
 - c. H_2S
 - d. CO_2
4. What are the hybridizations of carbons 1 and 2 respectively in the following structure?



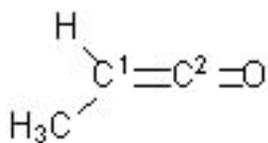
- a. sp^3 and sp^2
- b. sp^2 and sp^3
- c. sp^3 and sp
- d. sp^2 and sp^2

5. What are the hybridizations of atoms 1 and 2 respectively in the following structure?



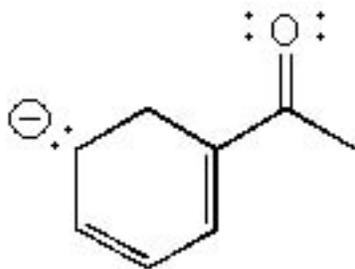
- a. sp^3 and sp^2
- b. sp^2 and sp^3
- c. sp^3 and sp
- d. sp^2 and sp^2

6. Identify the orbital hybridization at the two indicated carbons in the molecule below.



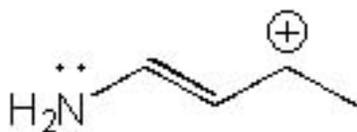
- a. C¹: sp ; C²: sp
- b. C¹: sp^2 ; C²: sp^2
- c. C¹: sp ; C²: sp^2
- d. C¹: sp^2 ; C²: sp

7. How many **total resonance structures** can be drawn for the following anion (include those without separation of charge)?



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

8. How many **resonance structures** can be drawn for the following molecule?

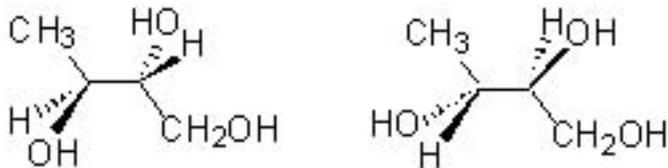


- a. 1
- b. 4
- c. 3
- d. 2

9. The correct geometry around oxygen in CH_3OCH_3 is

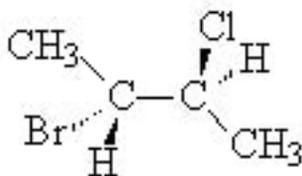
- a. linear.
- b. bent.
- c. tetrahedral.
- d. trigonal planar

10. Determine the relationship between the two molecules shown.



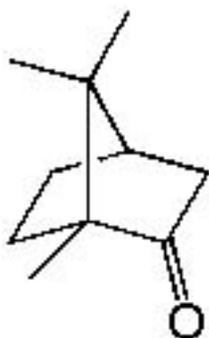
- a. constitutional isomers
- b. enantiomers
- c. diastereomers
- d. identical molecules

11. What is the correct name for this molecule?



- a. (2*R*,3*R*)-2-bromo-3-chlorobutane
- b. (2*S*,3*R*)-2-bromo-3-chlorobutane
- c. (2*S*,3*S*)-2-bromo-3-chlorobutane
- d. (2*R*,3*S*)-2-bromo-3-chlorobutane

12. What is the specific rotation $20[\alpha]_D$ of the following molecule?



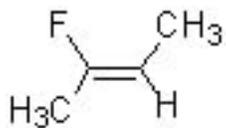
$$\alpha = 4.42^\circ$$
$$C = 0.1\text{g}\cdot\text{ml}^{-1}$$
$$l = 10\text{cm}$$

- a. $+4.42^\circ$
- b. $+0.442^\circ$
- c. $+44.2^\circ$
- d. -44.2°

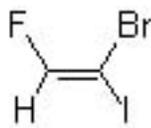
13. Which of the following physical properties differ for each of a pair of enantiomers?

- a. solubility in ethanol
- b. direction of rotation of plane-polarized light
- c. boiling point and melting point
- d. index of refraction

14. Determine the double bond stereochemistry (*E* or *Z*) for the following molecules.



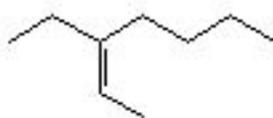
A



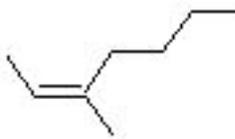
B

- a. **A: *E*; B: *E***
- b. **A: *Z*; B: *Z***
- c. **A: *E*; B: *Z***
- d. **A: *Z*; B: *E***

15. Determine the double bond stereochemistry (*E* or *Z*) for the following molecules.



A



B

- a. **A**: *E*; **B**: *E*
- b. **A**: *Z*; **B**: *Z*
- c. **A**: *E*; **B**: *Z*
- d. **A**: *Z*; **B**: *E*

Molecular Structure and Spectra

1. A strong signal at 1700 cm^{-1} in an IR spectrum indicates the presence of a(n)

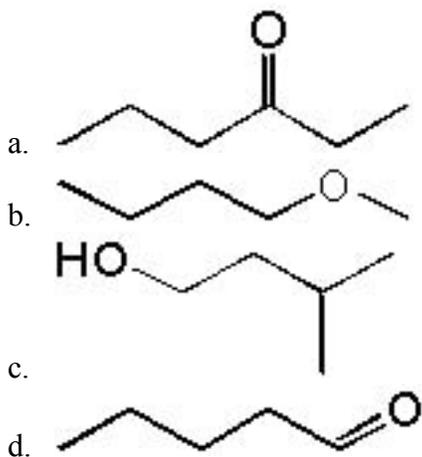
- a. alcohol
- b. ether
- c. carbonyl
- d. amine

2. A strong signal at 3400 cm^{-1} in an IR spectrum indicates the presence of a(n)

- a. alcohol
- b. ether
- c. carbonyl
- d. amine

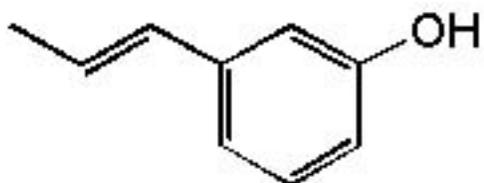
3. Deduce the structure of an unknown compound with molecular formula $C_5H_{12}O$ using information given by its infrared spectrum.

Intensity (peak):	Frequency (cm^{-1}):
m	3300
m	2900
m	2800
m	1465
m	1450
m	1375

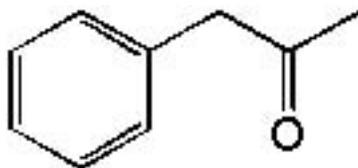


4. Deduce the structure of an unknown compound with molecular formula $C_9H_{10}O$ using information given by its infrared spectrum.

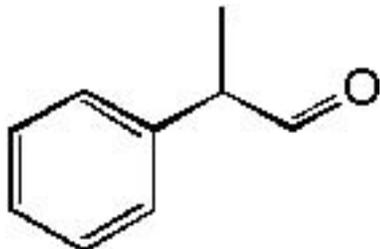
Intensity (peak):	Frequency (cm^{-1}):
s	3100
m	2900
m	2800
s	1710
m-w	1600
m-w	1475
m	1465
m	1450
m	1375



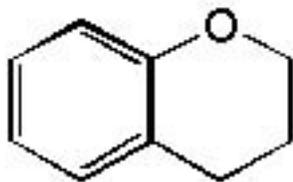
a.



b.



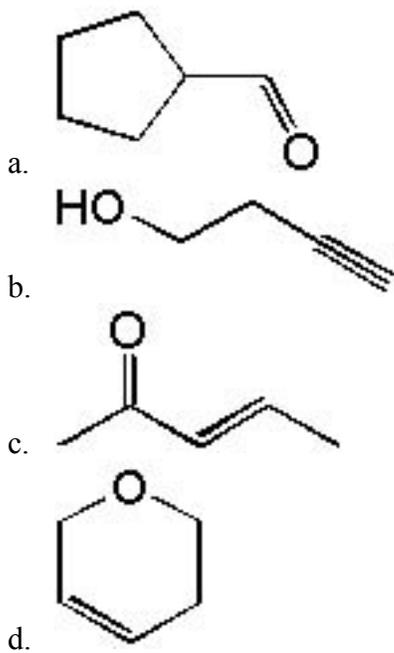
c.



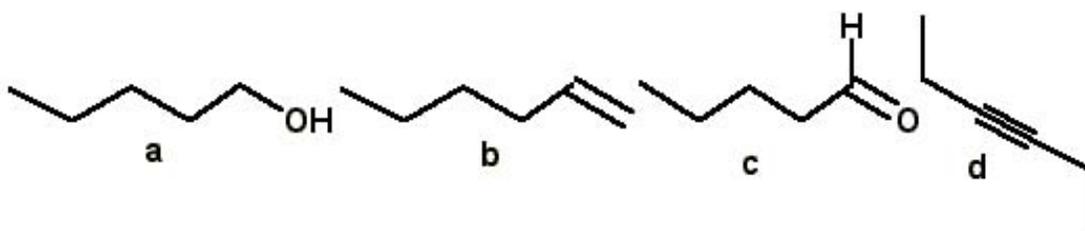
d.

5. Deduce the structure of an unknown compound with molecular formula C_5H_8O using information given by its infrared spectrum.

Intensity (peak):	Frequency (cm^{-1}):
m	3100
m	2800
s	1705
m-w	1640
m	1450
m	1375



6. Which of the following compounds a–d has an IR absorption at 3300 cm^{-1} ?



- a. a
- b. b
- c. c
- d. d

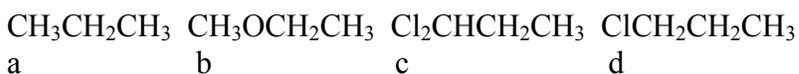
7. When an external magnetic field is applied, what happens to the protons in a sample?

- a. All protons align with the field.
- b. All protons align opposite to the field.
- c. Some protons align with the field and some align opposite to it.
- d. All protons assume a random orientation

8. Which of the following compounds has the MOST deshielded protons?

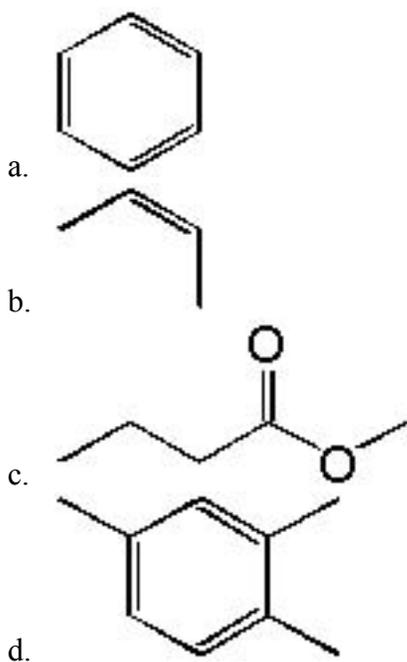
- a. CH_3Cl
- b. CH_3I
- c. CH_3Br
- d. CH_4

9. Arrange the following compounds in order of decreasing chemical shift for the underlined hydrogens (largest δ value first, smallest value last).



- a. $b > c > a > d$
- b. $b > c > d > a$
- c. $c > b > a > d$
- d. $c > b > d > a$

10. An unknown molecule A has 4 signals in the ^1H NMR spectrum. Which of the following corresponds to molecule A?



11. Deduce the structure of an unknown compound using the following ^1H NMR spectrum, mass spectroscopy data, and IR spectrum.

^1H NMR spectrum:

δ 1.30 (triplet, 6H)

δ 4.29 (quartet, 4H)

δ 7.4–7.9 (multiplet, 4H)

Mass Spectrum:

m/e: Intensity: (as % of base peak)

222 10%

177 38%

149 100%

IR Spectrum:

Intensity (peak): Frequency (cm^{-1}):

s 3100

m 2900

m 2800

s 1740

m-w 1600

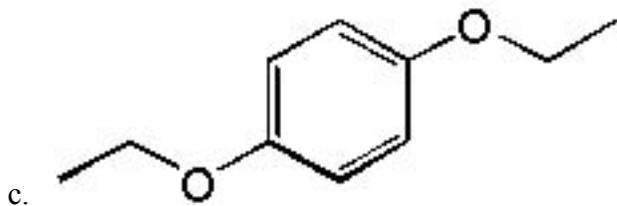
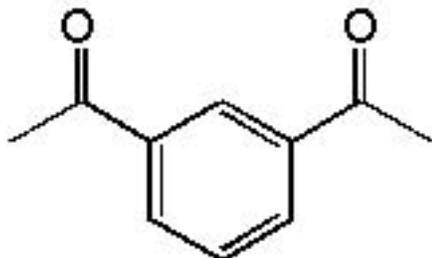
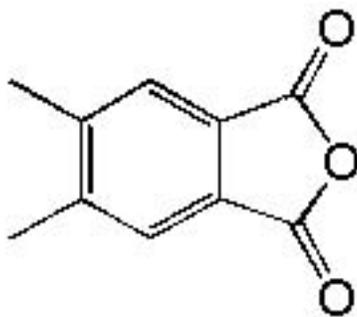
m-w 1475

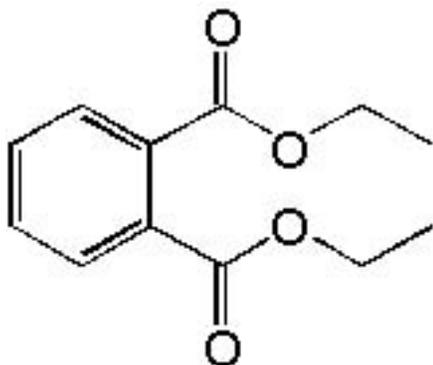
m 1465

m 1450

m 1375

s 1300–1000





d.

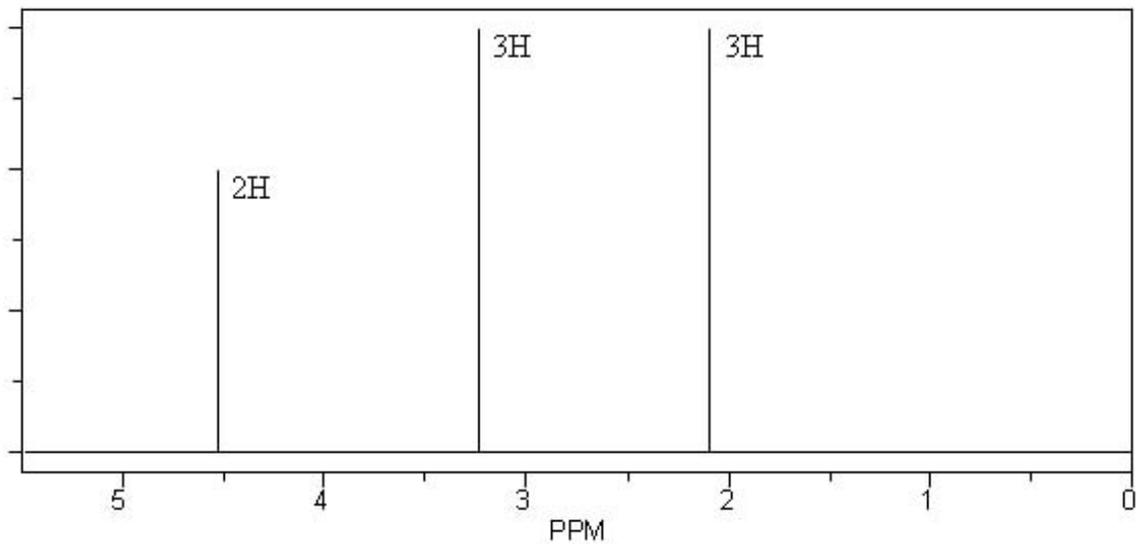
12. A compound of formula C₅H₁₂ gives 1 signal in the ¹H NMR and 2 signals in the ¹³C NMR. The compound is

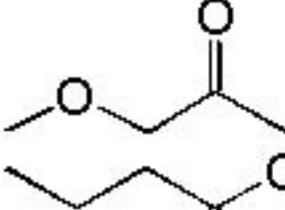
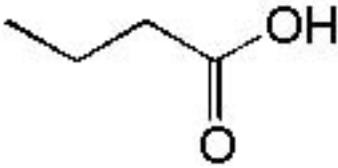
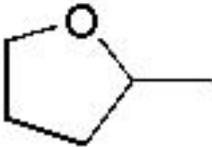
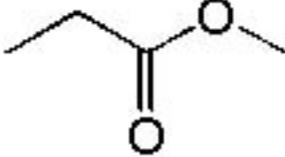
- a. pentane.
- b. 2-methylbutane.
- c. 2,2-dimethylpropane.
- d. Cannot tell without more information.

13. How many methyl peaks would you expect to observe in the ¹H NMR spectrum of *cis*-1,4-dimethylcyclohexane?

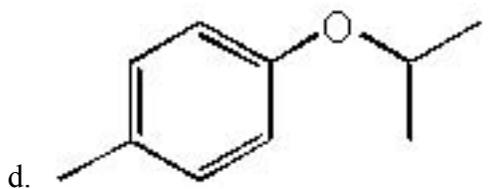
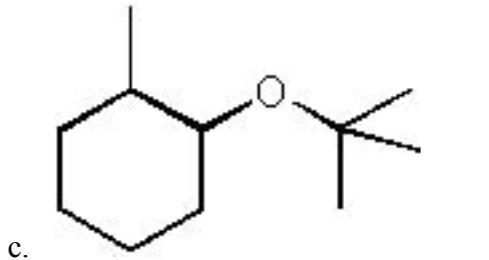
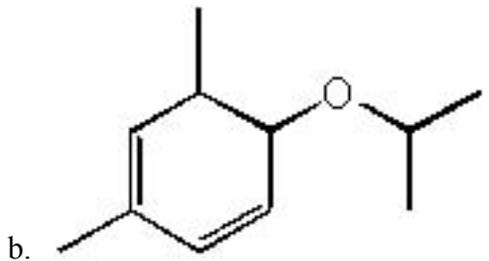
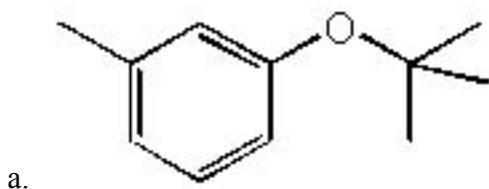
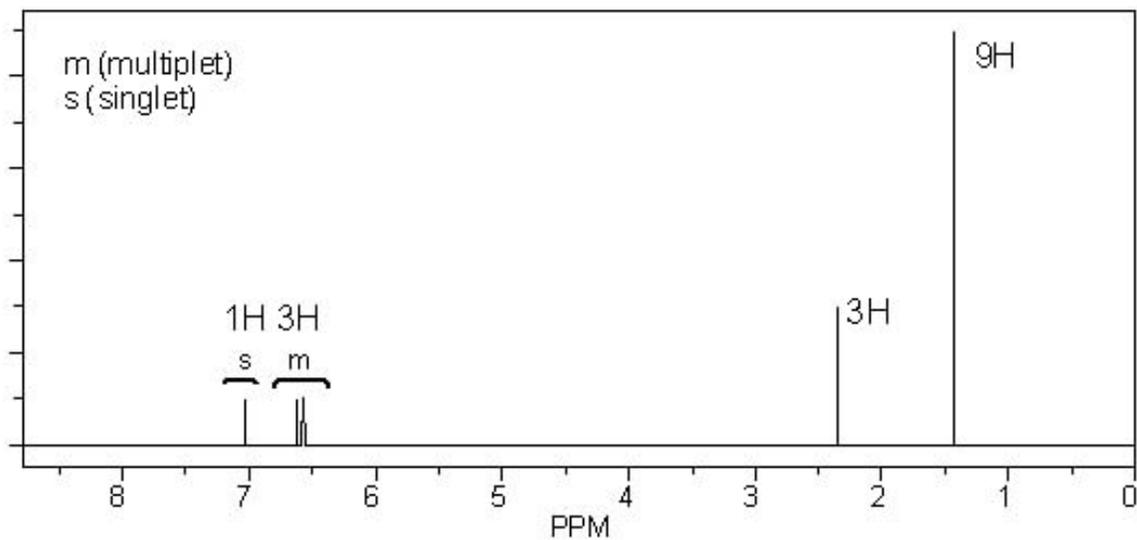
- a. 1
- b. 2
- c. 3
- d. 4

14. An unknown compound A has the molecular formula $C_4H_8O_2$. Based on the following 1H NMR spectrum, what is the structure of compound A?

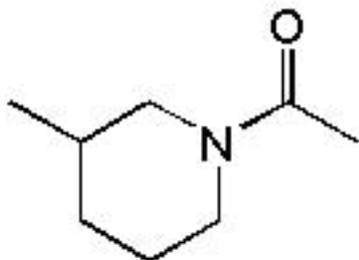


- a. 
COC(=O)CCOC
- b. 
OC(=O)CCC(O)C
- c. 
CC1OCCC1
- d. 
CCC(=O)OC

15. The ^1H NMR spectrum of a compound is shown below. What is the structure of the compound?

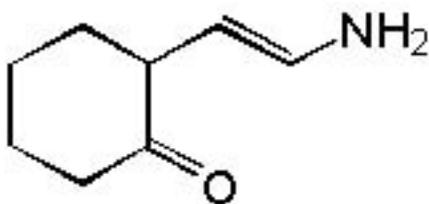


16. How many absorption bands will appear in the ^{13}C NMR spectrum for the following compound?



- a. 4
- b. 6
- c. 7
- d. 8

17. How many absorption bands will appear in the ^{13}C NMR spectrum for the following compound?



- a. 5
- b. 7
- c. 8
- d. 9

18. Not only the molecular ion peak, but all peaks in the mass spectrum of chlorobenzene are accompanied by a smaller peak one mass unit higher. This peak is due to which of the following?

- a. capture of an H atom
- b. presence of a ^{13}C
- c. presence of a ^{36}Cl
- d. capture of a proton

19. What is the exact mass (in atomic mass units: C, 12.0000; H, 1.0078; N, 14.0031; O, 15.9949) of the molecular ion of a compound with molecular formula $\text{C}_3\text{H}_8\text{O}$?

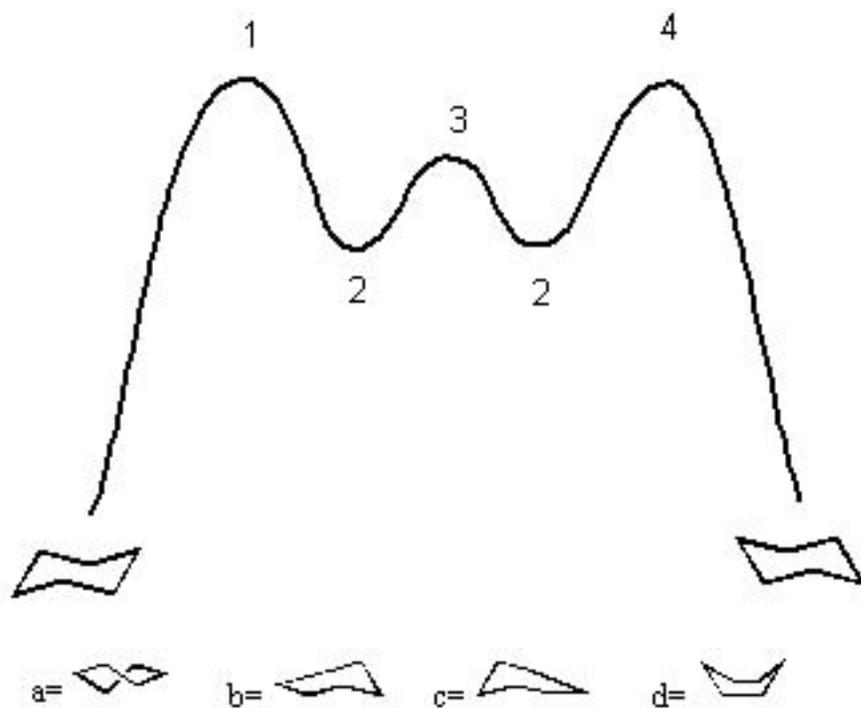
- a. 60.0000
- b. 60.0573
- c. 60.0624
- d. 59.9949

Separations and Purifications

- Which of the following may be separated by ordinary physical methods?
 - a pair of identical molecules
 - a pair of enantiomers
 - a pair of diastereomers
 - a pair of identical atoms
- Which of the following may be separated by ordinary physical methods?
 - (*R*)-3-bromo-1-butene and (*S*)-3-bromo-1-butene
 - cis*-2-bromo-2-butene and *trans*-2-bromo-2-butene
 - (2*R*,3*S*)-1,2-dibromobutane and (2*S*,3*R*)-1,2-dibromobutane
 - (*R*)-2-bromobutane and (*S*)-2-bromobutane

Hydrocarbons

- Place the following structures properly on the (abbreviated) energy surface for cyclohexane ring reversal.

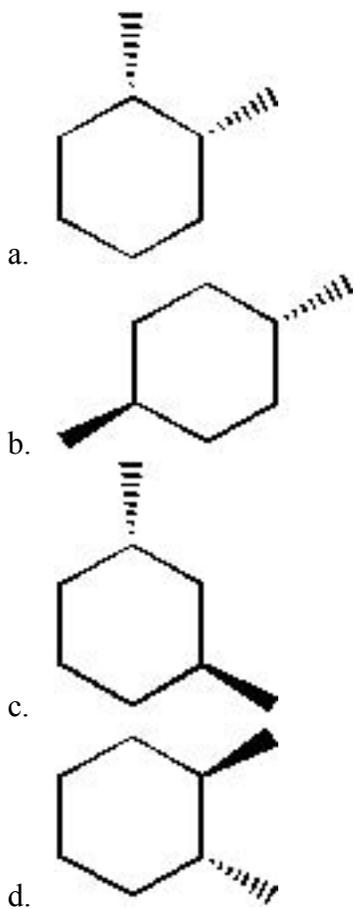


- 1 = b or c, 2 = a, 3 = d, 4 = b or c
- 1 = d, 2 = b or c, 3 = d, 4 = a
- 1 = d, 2 = b or c, 3 = a
- 1 = b or c, 2 = d, 3 = a, 4 = b or c

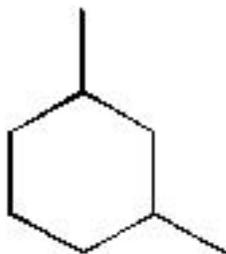
2. Which of the following cyclohexane conformations has the MOST energy (is the LEAST stable)?

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

3. Which of the following molecules is *trans*-1, 2-dimethylcyclohexane?



4. What is the IUPAC name of the following molecule?

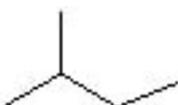


- a. 1,2-dimethylhexane
- b. 2,4-dimethylcyclohexane
- c. Dimethylcyclohexane
- d. 1,3-dimethylcyclohexane

5. Which compound has the highest melting point?

- a. decane
- b. 2,2,3,3-tetramethylbutane
- c. 2,2,3-trimethylpentane
- d. 4-methylnonane

6. Which of the following alkanes will have the lowest boiling point?

- a. 
- b. 
- c. 
- d. 

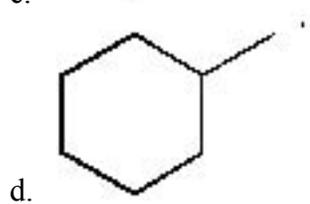
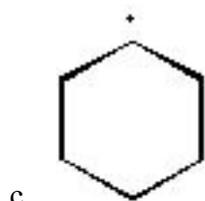
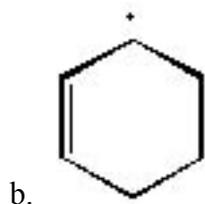
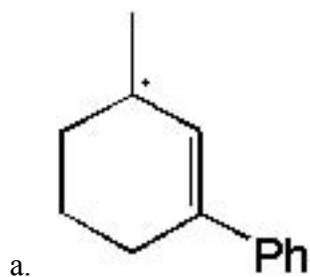
7. Which of the following cycloalkanes has the MOST strain energy?

- a. cyclobutane
- b. cyclopentane
- c. cyclohexane
- d. cycloheptane

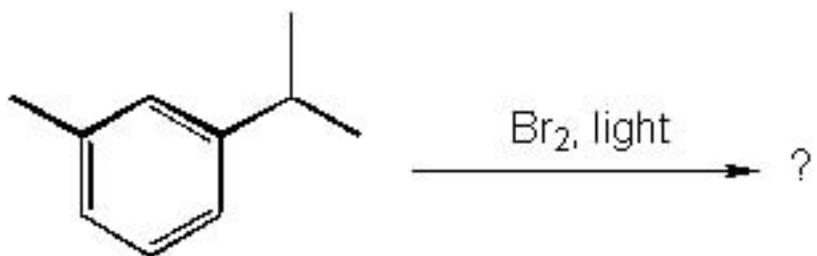
8. The balanced equation for the combustion of pentane is

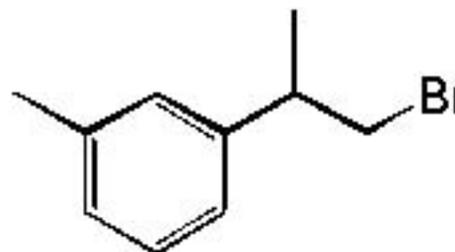
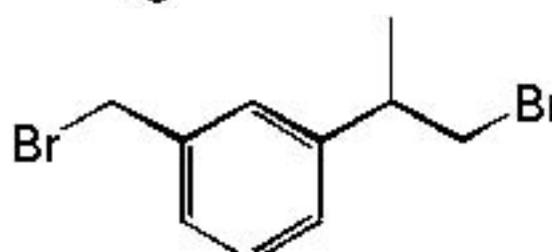
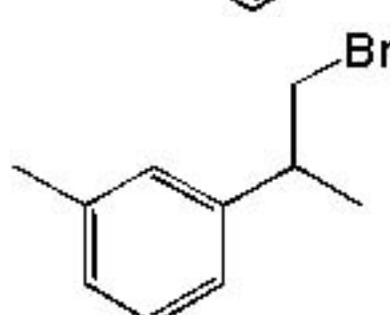
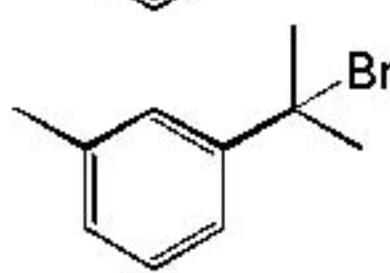
- a. $4 \text{C}_5\text{H}_{12} + 2 \text{O}_2 \rightarrow 20 \text{CH}_4 + 4 \text{H}_2\text{O}$
- b. $2 \text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CH}_4 + 2 \text{H}_2\text{O}$
- c. $\text{C}_5\text{H}_{12} + 8 \text{O}_2 \rightarrow 5 \text{CO}_2 + 6 \text{H}_2\text{O}$
- d. $\text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$

9. Which of the following is the most stable radical?

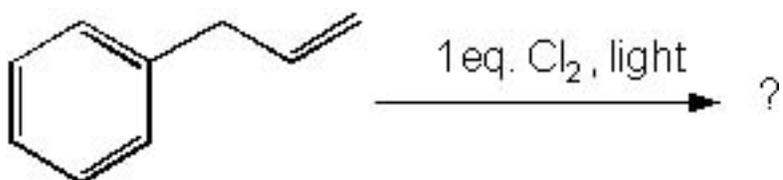


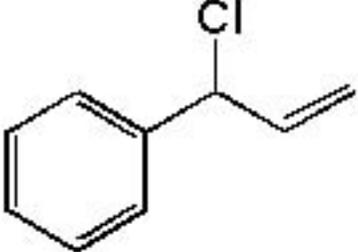
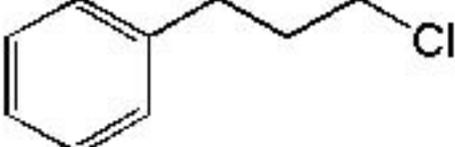
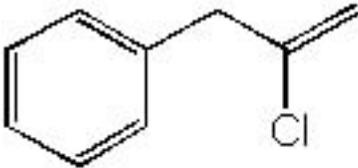
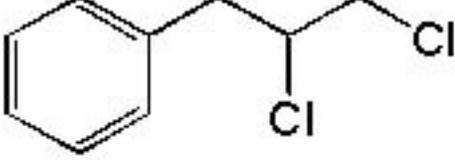
10. What is the major product of the following reaction?



- a. 
- b. 
- c. 
- d. 

11. What is the major product of the following reaction?

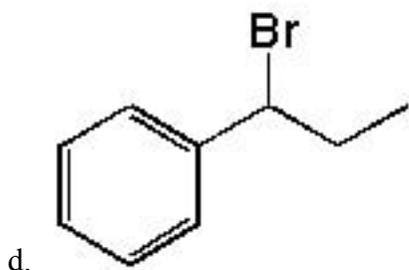
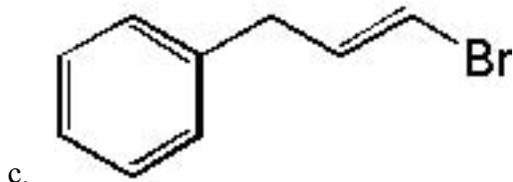
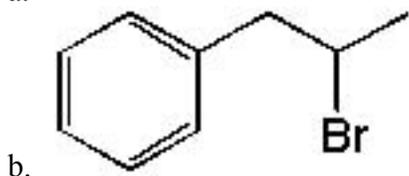
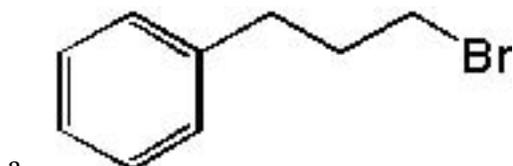
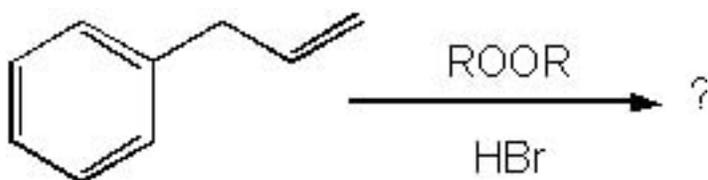


- a.  A benzene ring attached to a propene chain with a chlorine atom on the secondary carbon.
- b.  A benzene ring attached to a three-carbon alkane chain with a chlorine atom on the terminal carbon.
- c.  A benzene ring attached to a propene chain with a chlorine atom on the tertiary carbon.
- d.  A benzene ring attached to a three-carbon alkane chain with chlorine atoms on the secondary and tertiary carbons.

12. Which of the following occurs during the initiation stage of a radical mechanism?

- a. Nonradicals are formed from radicals.
- b. Radicals are formed from other radicals.
- c. Radicals are formed from nonradicals.
- d. Nonradicals are formed from other nonradicals.

13. What is the product of the following reaction?



14. Which version of the radical halogenation of an alkane is MOST selective?

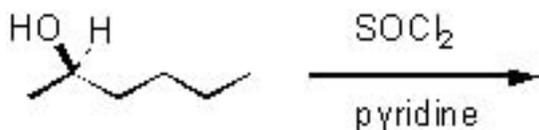
- a. fluorination
- b. chlorination
- c. bromination
- d. iodination

Oxygen-containing Compounds

1. Which of the following will NOT convert 1-butanol into 1-chlorobutane in one step?

- a. SOCl_2
- b. PCl_3
- c. HCl
- d. CCl_4

2. Give the major product of the following reaction.



- a.
- b.
- c.
- d.

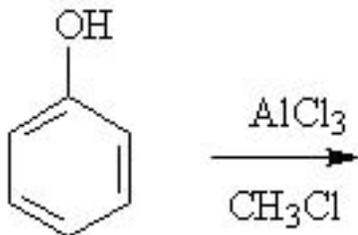
3. The Williamson ether synthesis produces ethers by reacting an

- a. alcohol with a metal.
- b. alkoxide with a metal.
- c. alkoxide with an alkyl halide.
- d. alkyl halide with an aldehyde.

4. Ozonolysis (O_3 in CH_2Cl_2) of compound A under reducing conditions (Zn /acetic acid) gives formaldehyde, 2-butanone, and compound B. Catalytic hydrogenation (H_2/Pd) of A gives 2,7-dimethylnonane. What is a possible structure for compound A?

- a. 2,7-Dimethyl-2,8-nonadiene
- b. 2,7-Dimethyl-1,8-nonadiene
- c. 2,7-Dimethyl-1,6-nonadiene
- d. 2,7-Dimethyl-1,7-nonadiene

5. Predict the major product of the following reaction.



- a. *m*-chlorophenol
- b. *o*-chlorophenol and *p*-chlorophenol
- c. *o*-hydroxytoluene and *p*-hydroxytoluene
- d. *m*-hydroxytoluene

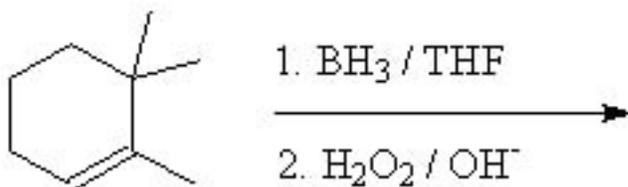
6. Which of the following compounds does NOT give a tertiary alcohol upon reaction with methylmagnesium bromide?

- a. 3-methylpentanal
- b. ethyl benzoate
- c. 4,4-dimethylcyclohexanone
- d. 4-heptanone

7. Which of the following compounds gives a secondary alcohol upon reaction with methylmagnesium bromide? Assume the usual acid workup.

- a. butyl formate
- b. 3-pentanone
- c. pentanal
- d. methyl butanoate

8. Predict the product of the following reaction.

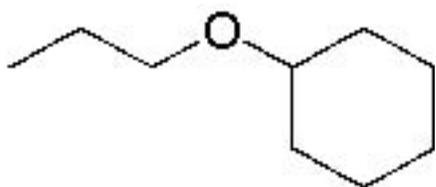


- a. (1*R*,2*S*)-2,3,3-trimethylcyclohexanol + enantiomer
- b. (*R*)-1,2,2-trimethylcyclohexanol + enantiomer
- c. (1*S*,2*S*)-2,3,3-trimethylcyclohexanol + enantiomer
- d. (1*R*,2*S*)-2,3,3-trimethylcyclohexanediol + enantiomer

9. Which of the following statements about organometallic compounds is FALSE?

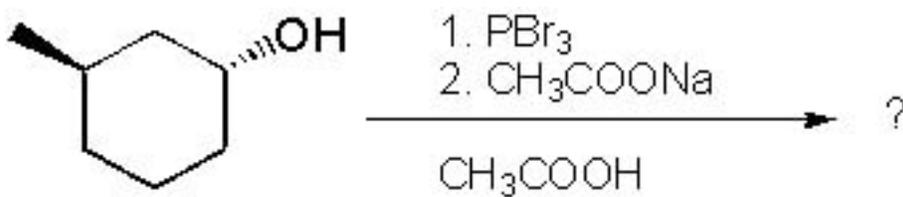
- a. Alkyl lithium reagents (RLi) add to the carbonyl group of aldehydes and ketones.
- b. Grignard reagents (RMgBr) add to the carbonyl group of aldehydes and ketones.
- c. Alkyl lithium and Grignard reagents do not add to esters.
- d. Grignard reagents are prepared in ether or tetrahydrofuran (THF).

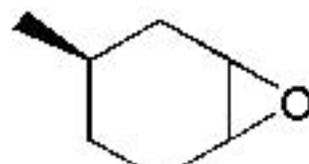
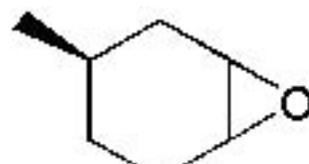
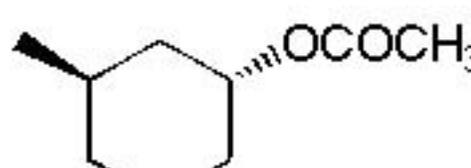
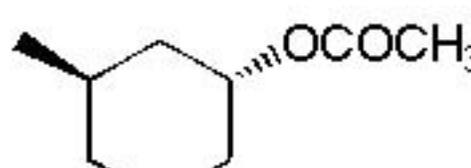
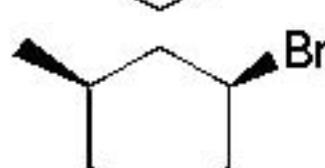
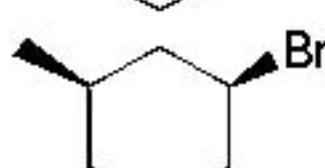
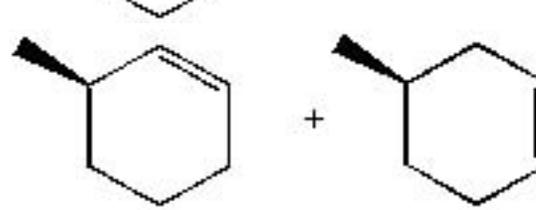
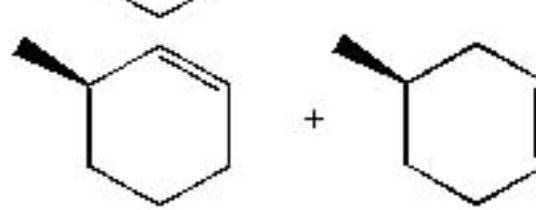
10. What is the name of the following compound?



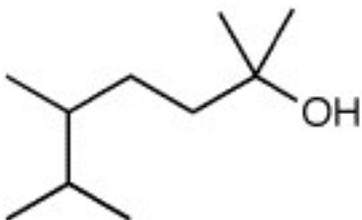
- a. Ethyl cyclohexyl ether
- b. Hexyl propyl ether
- c. 1-Ethoxycyclohexane
- d. Cyclohexyl propyl ether

11. What is the major product formed in the following synthesis?



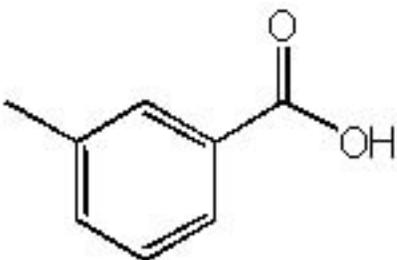
- a.  a. 
- b.  b. 
- c.  c. 
- d.  d. 

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



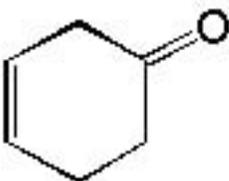
- a. 4-Isopropyl-1,1-dimethyl-1-pentanol
- b. 5-Isopropyl-1,1-dimethyl-2-hexanol
- c. 1,1,4,5-Tetramethyl-1-hexanol
- d. 2,5,6-Trimethyl-2-heptanol

13. What is the correct name of the following compound?



- a. 3-methylbenzoic acid
- b. *m*-methylbenzoate
- c. tolylcarboxylate
- d. methylbenzoate

14. What is the correct name of the following molecule?



- a. 3-hexene-1-one
- b. 5-cyclohexan-1-one
- c. 4-cycloheptenone
- d. 3-cyclohexen-1-one

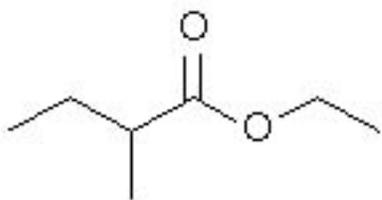
15. Predict which of the following compounds will have a lower boiling point than 1-butanol.

- a. 1-butanol
- b. 2-butanol
- c. 1-butene
- d. butanoic acid

16. Predict the product of the following reaction. $\text{PhCH}_2\text{OH} + \text{PCC}$ (pyridinium chlorochromate) in methylene chloride \rightarrow

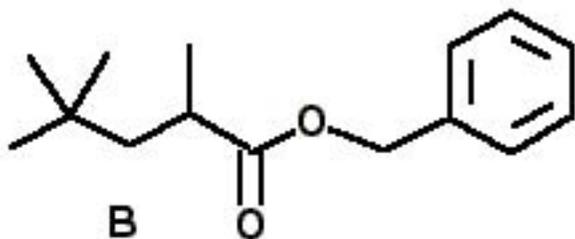
- a. benzophenone
- b. benzoic acid
- c. benzaldehyde
- d. benzyl chloride

17. What is a proper name for the following ester?



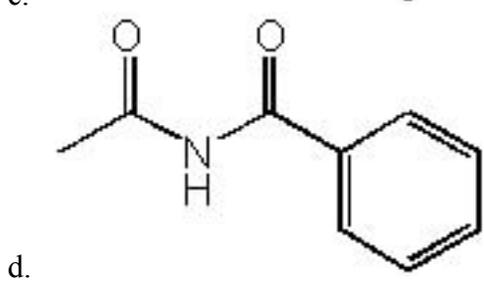
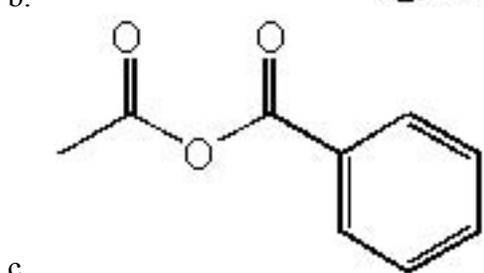
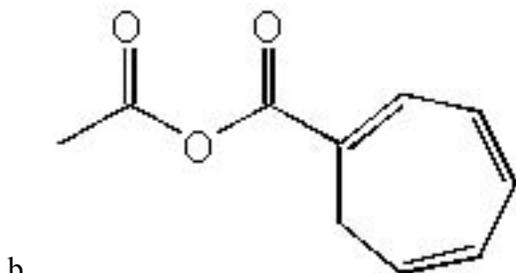
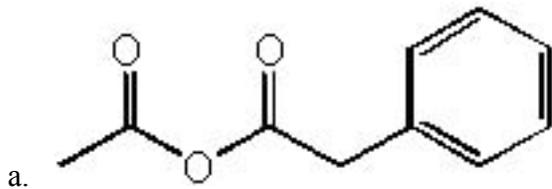
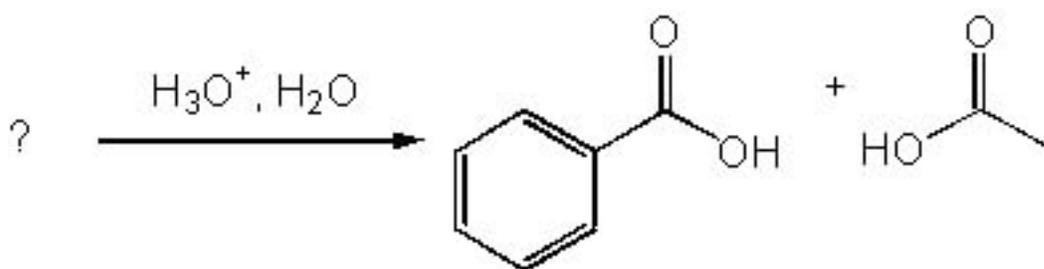
- a. 2-butyl ethylester
- b. ethyl 2-pentanoate
- c. ethyl 2-methylbutanoate
- d. methylbutanoic ethyl ester

18. The correct IUPAC name for ester B is

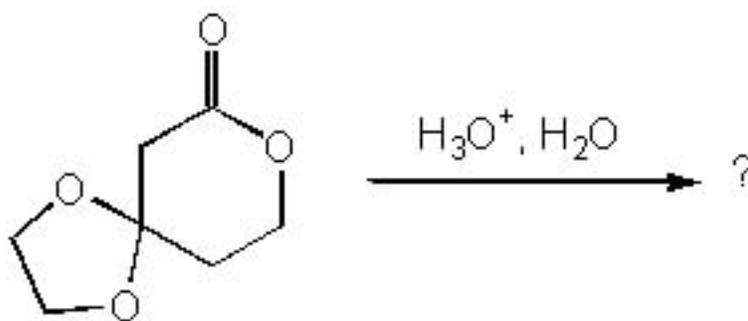


- a. phenylmethyl-2,4,4-trimethylpentanoate
- b. benzyl 2-methyl-4,4-dimethylpentanoate
- c. benzyl 2,4,4-trimethylpentanoate
- d. benzyl 2,4,4-trimethylbutanoate.

19. What is the acid anhydride that is hydrolyzed?

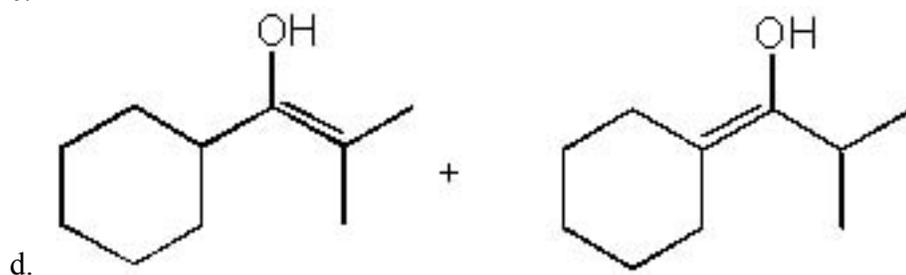
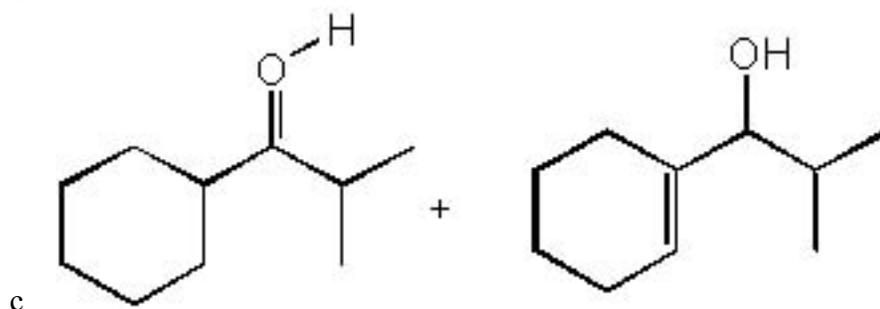
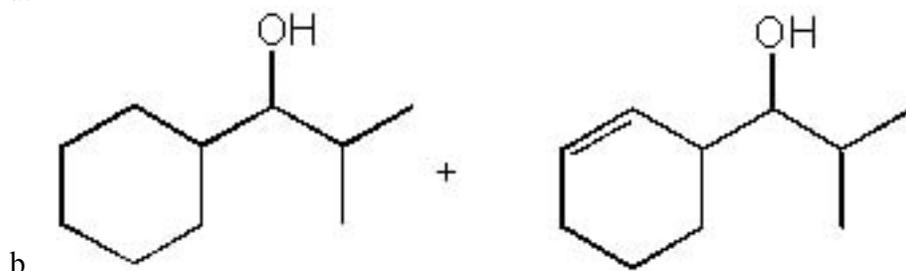
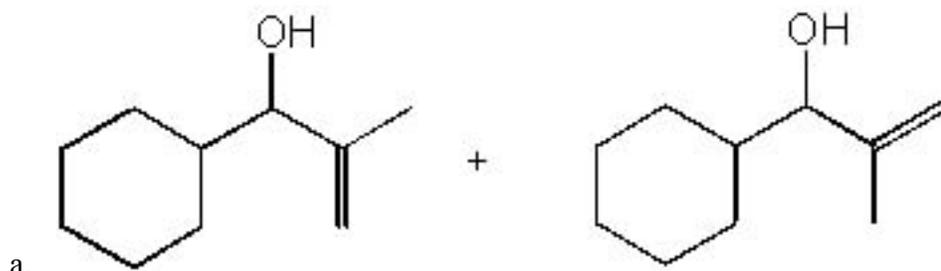
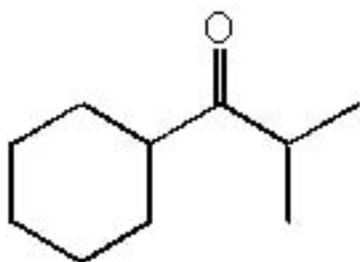


20. What is the product of the following reaction?

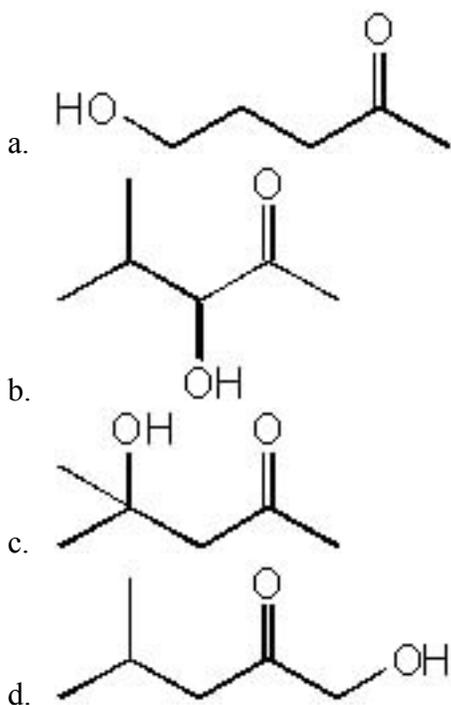


- a.
- b.
- c.
- d.

21. What are the two possible tautomers for the following ketone?

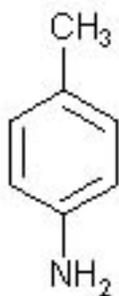


22. Which of the following compounds is the product of an aldol condensation reaction?



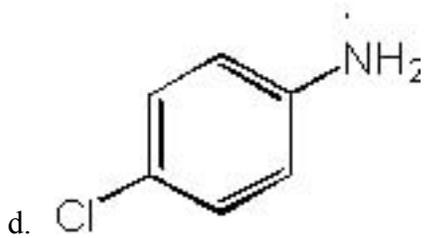
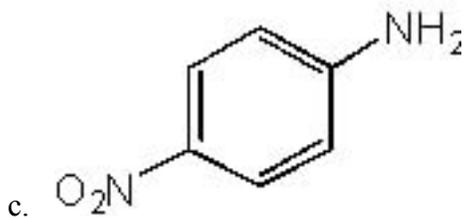
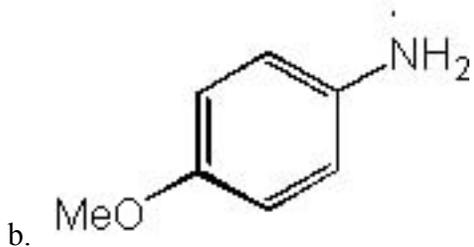
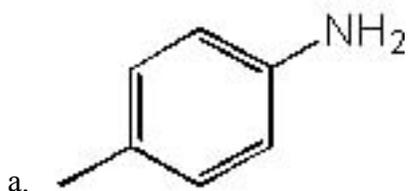
Amines

1. What is the sequence of reagents that will accomplish the synthesis of the following aromatic amine from benzene?

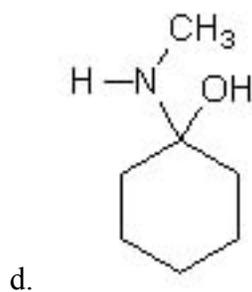
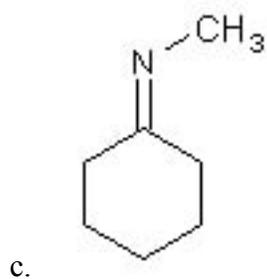
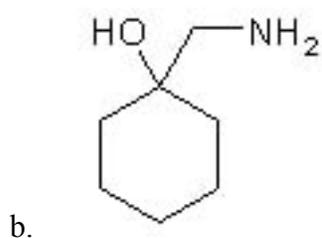
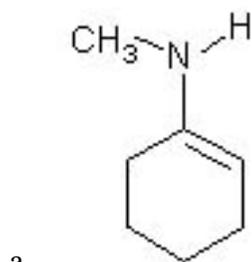
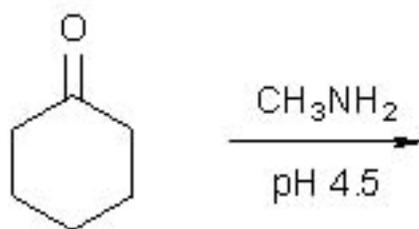


- CH_3Cl , AlCl_3 ; HNO_3 , H_2SO_4 ; H_2
- CH_3Cl , AlCl_3 ; HNO_3 , H_2SO_4 ; Fe , HCl ; NaOH
- HNO_3 , H_2SO_4 ; Fe , HCl ; NaOH ; CH_3Cl , AlCl_3
- HNO_3 , H_2SO_4 ; CH_3Cl , AlCl_3 ; Fe , HCl ; NaOH

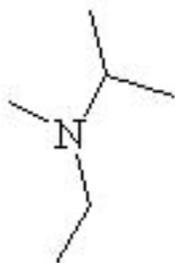
2. Which of the following aniline derivatives is the strongest base?



3. What is the product of the following reaction?

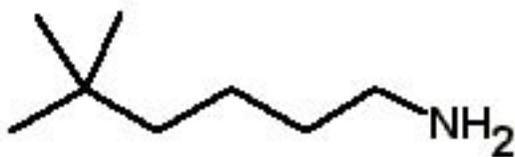


4. What is the name of the following compound?

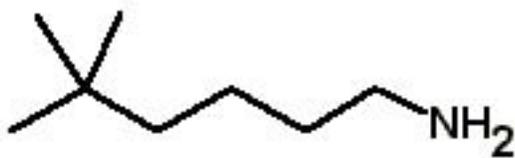


- a. ethylmethylisopropylamine
- b. ethylpropyl*sec*-butylamine
- c. ethylmethylpropylamine
- d. *sec*-butylethylpropylamin

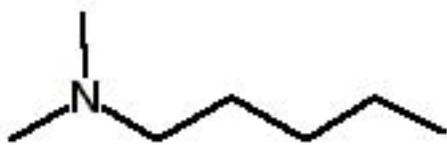
5. Which of the following amines is a tertiary amine?



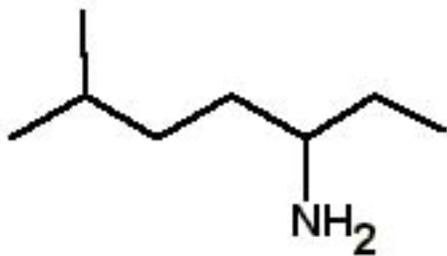
a.



b.

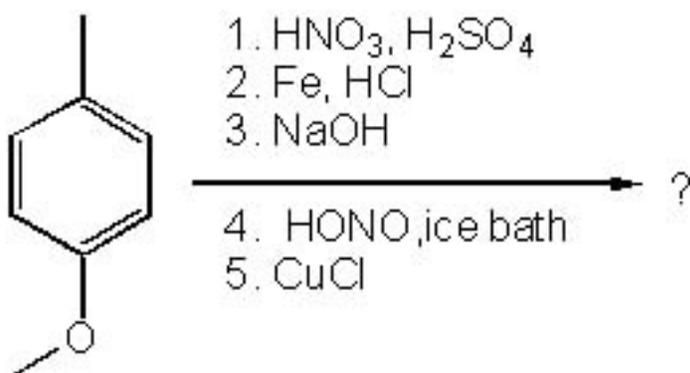


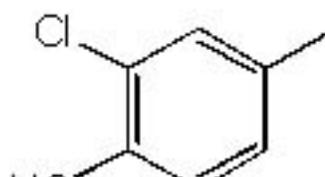
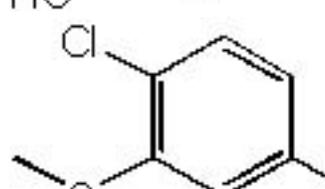
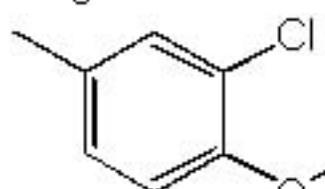
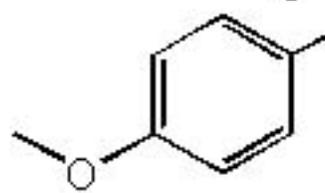
c.



d.

6. What is the product of the following synthesis?



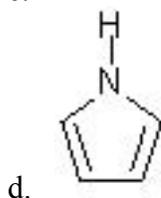
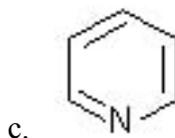
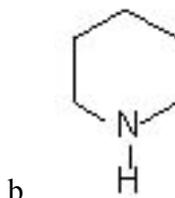
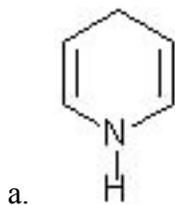
- a. 
- b. 
- c. 
- d. 

7. Supply the correct words to complete this sentence: Electron-withdrawing groups such as nitro _____ the basicity of anilines, especially when substituted _____.

- a. increase ; ortho or para
b. increase ; meta
c. decrease ; ortho or para
d. decrease ; meta

Biological Molecules

1. Which of the following amines is pyridine?



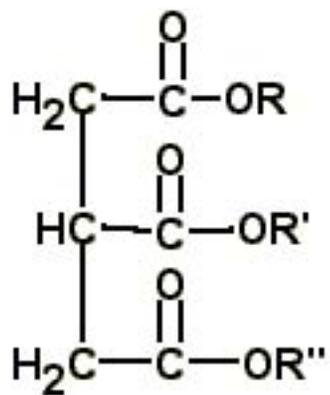
2. Which of the following statements is NOT true regarding fatty acids?

- Fatty acids dissolve in nonpolar solvents.
- Triglycerides are esters of fatty acids.
- Most naturally occurring fatty acids have trans double bonds.
- Fatty acids are biosynthesized from acetate.

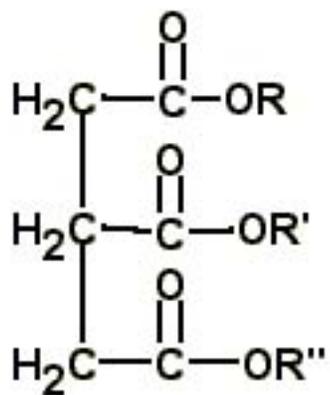
3. Which of the following statements regarding the biosynthesis of cholesterol is FALSE?

- Cholesterol has the same carbon skeleton as its biosynthetic precursor, lanosterol.
- Cholesterol is derived from the dimerization of farnesyl pyrophosphate in a head-to-head manner.
- Cyclization of squalene to cholesterol is initiated by acid-catalyzed ring opening of an epoxide.
- Cholesterol has three fewer carbon atoms than lanosterol.

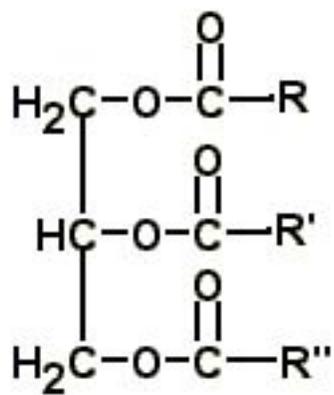
4. Which of the following represents the structure of a triacylglyceride?



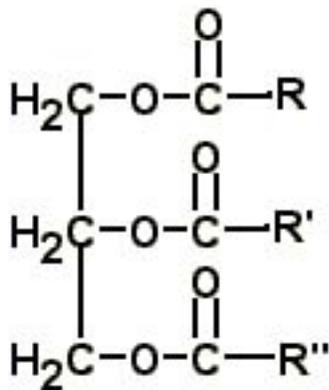
a.



b.



c.

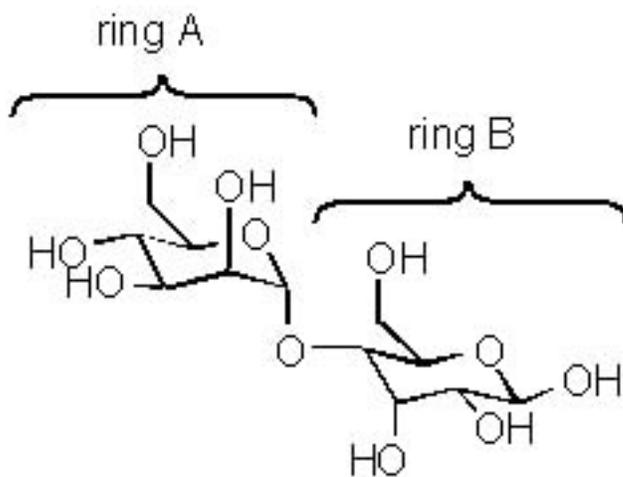


d.

5. Which of the following compounds does NOT undergo mutarotation?

- a. glucose
- b. sucrose
- c. ribose
- d. fructose

6. Which statements are correct about the following disaccharide?



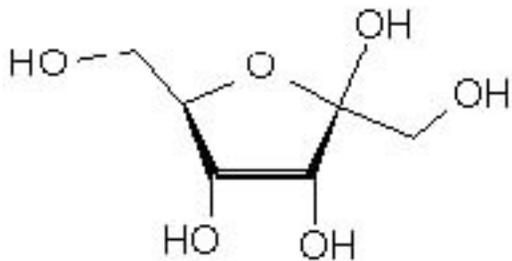
- a. Ring A is an acetal in the α configuration; ring B is a hemiacetal in the β configuration.
- b. Ring A is an acetal in the β configuration; ring B is a hemiacetal in the α configuration.
- c. Ring A is a hemiacetal in the α configuration; ring B is an acetal in the β configuration.
- d. Ring A is a hemiacetal in the β configuration; ring B is an acetal in the α configuration.

7. A glycoside is the carbohydrate form of an
- ether.
 - acetal.
 - aglycone.
 - alcohol.
8. Which of the following amino acids is achiral?
- alanine
 - glycine
 - serine
 - cysteine
9. Which of the following is NOT a part of the primary protein structure?
- the amino acid sequence
 - the disulfide linkages
 - the planar nature of the amide linkage
 - the conformation of the polypeptide backbone
10. Which of the following statements about the conformation (secondary and tertiary structure) of proteins is FALSE?
- The four atoms of an amide linkage ($-\text{CO}-\text{NH}-$) lie in a plane as a result of resonance between the nitrogen and the carbonyl group.
 - Electrostatic attraction occurs between basic and acidic side chains.
 - The favored conformation of a protein is always that which has the greatest number of hydrogen bonds.
 - The presence of the amino acid proline has the effect of turning a corner in a protein.
11. Which of the following statements about an enzyme is FALSE?
- An enzyme is usually a large protein.
 - An enzyme is a catalyst for biological reactions.
 - An enzyme is a chiral molecule.
 - An enzyme changes the equilibrium constant of a reaction.
12. Which of the following statements about the arrangement of a protein in three dimensions is FALSE?
- As a result of hydrogen bonding, a portion of a protein may exist as a right-handed α -helix with 3.6 amino acid residues per turn, and a repeat unit of 5.4 Å.
 - As a result of hydrogen bonding a portion of a protein may exist as a pleated sheet, in which the repeat unit is 7.0 Å.
 - In a pleated sheet, the polyamide chains may be parallel or antiparallel.
 - A portion of a protein may exist as a flat sheet with a repeat unit of 7.2 Å.

13. Which of the following is NOT an example of secondary structure found in proteins?

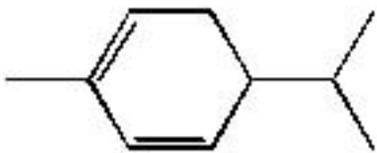
- a. β -pleated sheet
- b. α -helix
- c. hydrophobic folding
- d. random coil

14. Which descriptors fit the following sugar best?



- a. ketose, furanose, α
- b. ketose, furanose, β
- c. aldose, pyranose, β
- d. aldose, pyranose, α

15. Where are the isoprene subunits in the following terpene?



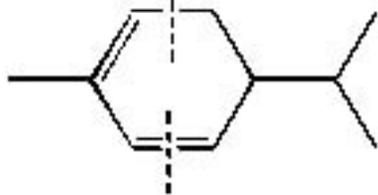
a.



b.

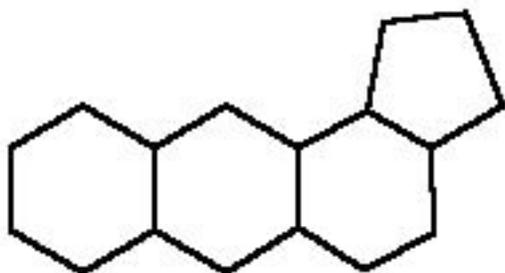


c.

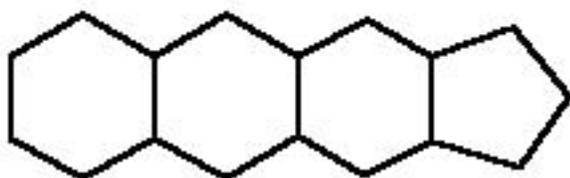


d.

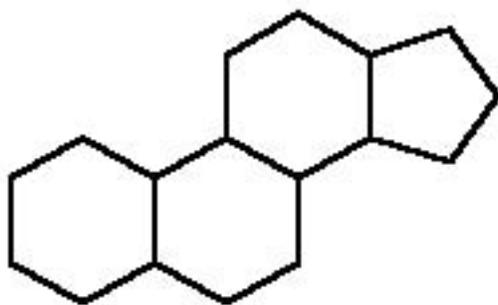
16. Which of the following tetracyclic compounds corresponds to the typical 17-carbon steroid nucleus?



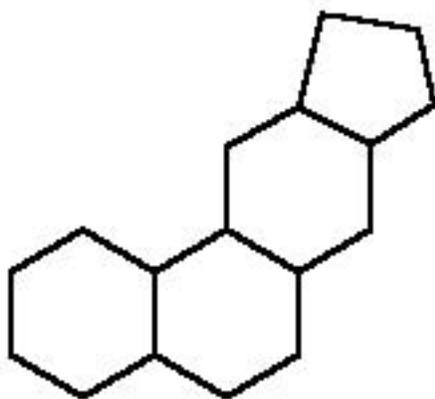
a.



b.

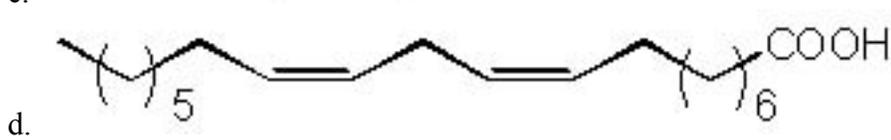
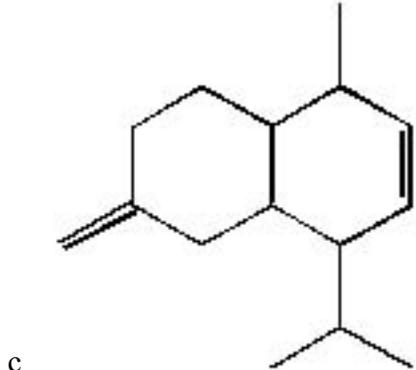
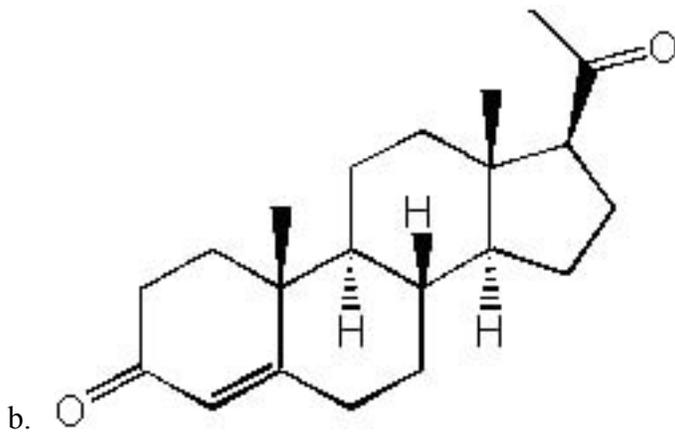
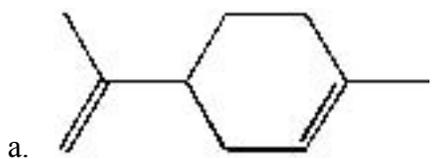


c.



d.

17. Which of the following is a steroid?



Organic Chemistry Answers

The Covalent Bond

1. (b)
2. (d)
3. (a)
4. (a)
5. (d)
6. (d)
7. (d)
8. (c)
9. (b)
10. (b)
11. (d)
12. (c)
13. (b)
14. (d)
15. (b)

Molecular Structure and Spectra

1. (c)
2. (a)
3. (c)
4. (b)
5. (c)
6. (a)

7. (c)

8. (a)

9. (b)

10. (c)

11. (d)

12. (c)

13. (a)

14. (a)

15. (a)

16. (d)

17. (c)

18. (b)

19. (b)

Separations and Purifications

1. (c)

2. (b)

Hydrocarbons

1. (a)

2. (b)

3. (d)

4. (d)

5. (b)

6. (c)

7. (a)

8. (c)

9. (a)

10. (d)

11. (a)

12. (c)

13. (a)

14. (c)

Oxygen-containing Compounds

1. (d)

2. (b)

3. (c)

4. (c)

5. (c)

6. (a)

7. (c)

8. (c)

9. (c)

10. (d)

11. (b)

12. (d)

13. (a)

14. (d)

15. (c)

16. (c)

17. (c)

18. (c)

19. (c)

20. (c)

21. (d)

22. (c)

Amines

1. (b)

2. (b)

3. (c)

4. (a)

5. (c)

6. (c)

7. (c)

Biological Molecules

1. (c)

2. (c)

3. (a)

4. (c)

5. (b)

6. (a)

7. (b)

8. (b)

9. (d)

10. (c)

11. (d)

12. (d)

13. (c)

14. (b)

15. (c)

16. (c)

17. (b)