



CHEMISTRY

BOOKS - R SHARMA CHEMISTRY (HINGLISH)

ISOMERISM

Examples

1. Write the structure of different isomeric alkanes corresponding to the molecular

formula C_6H_{14} . Also give their *IUPAC* names.

Strategy: Start with the longest continuous chain with no branching and go on increasing the number of branching by removing one, two, etc, C atoms from the longest chain and reattaching them, but do not attach them to the terminal C atoms.



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2. Draw the structures of the nine isomeric heptanes (C_7H_{16}).

Strategy: start with the straight chain isomer (longest chain). Going to a six-carbon chain, a CH_3 may be placed either on $C - 2$ or on $C - 3$ to give two isomers. Starting with a five-carbon chain, either two CH_3 , or a CH_3CH_2 must be added as side chain for a total of seven C's. The two CH_3 may be placed on the same C atom or on different carbons giving a total of four isomers. The CH_3CH_2 group can only be placed on the central C atom. At other

points it either lengthens the chain or reproduces previous isomer. Finally, go for a four carbon chain and three CH_3 's to form the ninth isomer.



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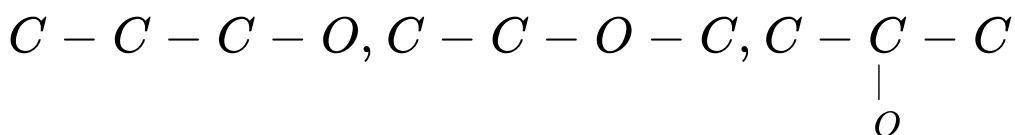
3. Write down the acyclic isomers having the molecular formula C_3H_6O .

Strategy: first calculate the degree of unsaturation or DBEs:

$$DBE = \frac{\sum n(v - 2)}{2} + 1$$

$$= \frac{3(4 - 2) + 6(1 - 2) + 1(2 - 2)}{2} + 1 = 1$$

This means that various acyclic isomers of C_3H_6O contain just one double bond, i.e., $C = C$ or $C = O$, in the following skeletons:



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4. Write all the acyclic and cyclic isomers of a compound having molecular formula C_3H_6O .



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5. Write down the structural isomeric ethers corresponding to the molecular formula $C_5H_{12}O$.

$$\begin{aligned} DBE &= \frac{\sum n(v-2)}{2} + 1 \\ &= \frac{5(4-2) + 12(1-2) + 1(2-2)}{2} + 1 = 0 \end{aligned}$$

This implies that only saturated acyclic ethers are to be considered



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Follow Up Test 1

1. Isomers do not have

A. same number of atoms

B. same kinds of atoms

C. same molecular formula

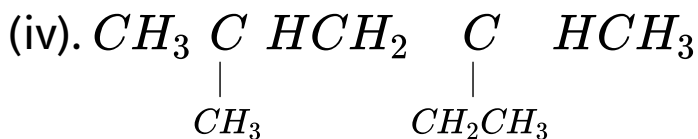
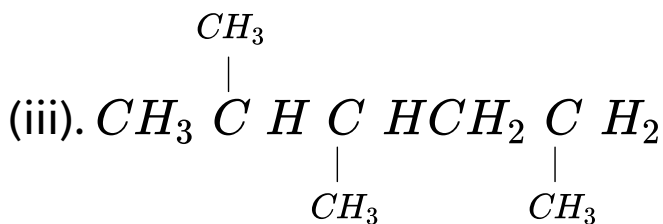
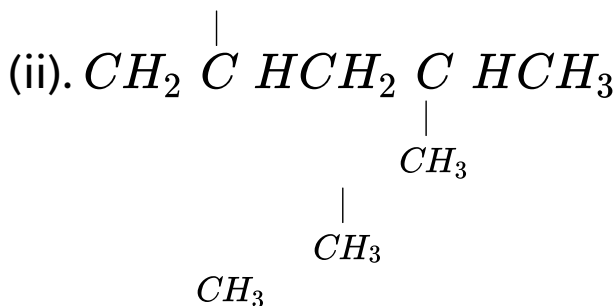
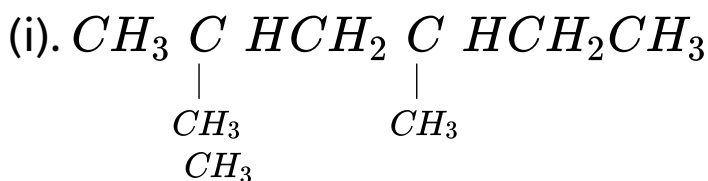
D. same properties

Answer: D



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2. Which of the following are constitutional isomers?



A. (i),(ii)

B. (i),(iv)

C. (i),(iii)

D. (ii),(iv)

Answer: C



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3. Consider the simplest alkane having only one $2^\circ C$ one $3^\circ C$, and one $4^\circ C$, how many structural isomers are possible?

A. only one

B. Three

C. Two

D. four

Answer: B



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4. What is the maximum number of methyl group possible for C_8H_{18} ?

A. Eight

B. Seven

C. six

D. Five

Answer: C



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5. Draw the structures of the nine isomeric heptanes (C_7H_{16}).

Strategy: start with the straight chain isomer (longest chain). Going to a six-carbon chain, a

CH_3 may be placed either on $C - 2$ or on $C - 3$ to give two isomers. Starting with a five-carbon chain, either two CH_3 , or a CH_3CH_2 must be added as side chain for a total of seven C's. The two CH_3 may be placed on the same C atom or on different carbons giving a total of four isomers. The CH_3CH_2 group can only be placed on the central C atom. At other points it either lengthens the chain or reproduces previous isomer. Finally, go for a four carbon chain and three CH_3 's to form the ninth isomer.

A. eight

B. Seven

C. nine

D. six

Answer: C



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6. How many chain isomers of hexane, $CH_3(CH_2)_4CH_3$, are possible ?

A. five

B. six

C. three

D. four

Answer: D



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Follow Up Test 2

1. How many constitutional isomers are possible for the alkene C_4H_8 ?

A. Two

B. Three

C. Four

D. Five

Answer: B



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2. Which of the statements are correct for alkyne with molecular formula C_6H_{10} ?

A. Six

B. Nine

C. Right

D. Seven

Answer: D



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3. Which of the statements are correct for alkyne with molecular formula C_6H_{10} ?

A. Four

B. Five

C. Three

D. Six

Answer: A



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4. Which of the statements are correct for alkyne with molecular formula C_6H_{10} ?

A. Two

B. Three

C. seven

D. four

Answer: B



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5. How many dichloro derivatives (only constitutional isomers) of propane ($C_3H_5Cl_2$) are possible?

A. Six

B. Four

C. Five

D. Seven

Answer: B



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6. How many trichloro derivatives (only constitutional isomers) of propane ($C_3H_5Cl_3$) are possible?

- A. Six
- B. four
- C. Five
- D. Seven

Answer: C



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7. How many dibromopentanes ($C_5H_{11}Br_2$) are possible if only structural isomers are considered?

A. Nine

B. Ten

C. Eleven

D. Eight

Answer: D



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8. How many dibromobutanes ($C_4H_8Br_2$) are possible if only structural isomers are considered?

A. Eight

B. Seven

C. nine

D. Six

Answer: C



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9. Which of the following alkanes gives two monochloro derivatives?

- A. 2-methylpentane
- B. n-hexane
- C. 2,3-dimethylbutane
- D. 2,2-dimethylbutane

Answer: C



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10. Which of the following pairs of compounds are position isomers?

- A. Ethyl alcohol and ethylene glycol
- B. isopentyl alcohol and neopentyl alcohol
- C. isobutyl alcohol and s-butyl alcohol
- D. isobutyl alcohol and t-butyl alcohol

Answer: D



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11. Which of the following compounds exhibit chains as well as position isomerism?

(i) t-Butyl alcohol

(ii) Isobutyl alcohol

(iii) sec-Butyl alcohol

(iv) n-Butyl alcohol

A. (iii),(iv)

B. (ii),(iv)

C. (i),(iv)

D. (i),(iii)

Answer: C



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12. Which of the following pairs of compounds are not position isomers?

A. s-Butyl alcohol and t-butyl alcohol

B. propylene glycol and trimethylene glycol

C. isobutylamine and t-butylamine

D. Ethylene dichloride and ethylidene dichloride

Answer: A



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13. How many following pairs of compounds are not position isomers?

A. Three

B. Two

C. Four

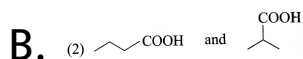
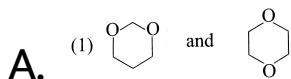
D. Five

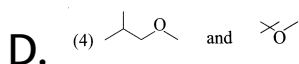
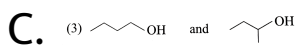
Answer: C



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14. Which of the following pairs of compounds are not position isomers?





Answer: B

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Follow Up Test 3

1. How many alkynes and dienes are possible for the molecular formula C_5H_8 ?

A. Six

B. seven

C. eight

D. nine

Answer: C



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2. The total number of constitutional isomers having the molecular formula C_3H_8O is

A. 3

B. 4

C. 2

D. 5

Answer: A



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3. Which of the following compounds is isomeric with propanal?

A. Ethyl methyl ether

B. Propan-1-ol

C. methyl vinyl ether

D. propan-2-ol

Answer: C



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4. The compound which is not isomeric with diethyl ether is :

A. 2-methylpropane-2-ol

B. Butanone

C. Butan-1-ol

D. methyl n-propyl ether

Answer: B



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5. How many structural isomers (aldehyde+ketone) are possible for $C_5H_{10}O$?

A. Seven

B. five

C. six

D. four

Answer: A



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6. Which of the following is not an isomer of cyclopropanol?

A. Allyl alcohol

B. Acetone

C. Propan-2-ol

D. 2-methyloxirane

Answer: C



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7. The number of carboxylic acid with the formula $C_5H_{10}O_2$ exhibiting constitutional isomerism is

A. four

B. five

C. three

D. two

Answer: A



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8. Amino acids are functional isomers of

(i) oximes

(ii) amides

(iii) alkyl nitrites

(iv) nitroalkanes

A. (i),(ii),(iii),(iv)

B. (i),(ii)

C. (iii),(iv)

D. (ii),(iii),(iv)

Answer: C



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9. The total number of amines with molecular formula C_3H_8N exhibiting constitutional isomerism is

A. 5

B. 4

C. 2

D. 3

Answer: B



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10. The number of primary alcohols with the formula $C_4H_{10}O$ is

A. 4

B. 3

C. 2

D. 5

Answer: C



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11. The total number of aromatic amines possible with the molecular formula C_7H_9N is

- A. Six
- B. four
- C. three
- D. Five

Answer: D



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12. Which of the following pairs of compounds are not functional isomers?

A. Methyl cyanide and methyl isocyanide

B. nitromethane and methyl nitrite

C. Ethylidene dichloride and ethylene dichloride

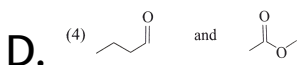
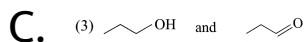
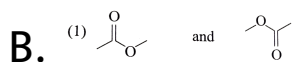
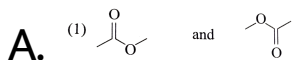
D. glucose and fructose

Answer: C



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13. Which of the following pairs of compounds are functional isomers?



Answer: D



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14. Which of the following pairs of compounds may be regarded both as position isomers and functional isomers?

A. o-cresol and p-cresol

B. Benzyl alcohol and methoxybenzene

C. benzyl alcohol and o-cresol

D. benzyl alcohol and benzyl methyl ether

Answer: C



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Follow Up Test 4

1. Which of the following constitutional isomerism arises due to different organic groups on either side of the functional group in the molecule?

A. Chain isomerism

B. Metamerism

C. Position isomerism

D. Functional group isomerism

Answer: B



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2. Which of the following is not a correct statement?

A. Pentan-3-one is a metamer of pentan-2-one.

B. Diethylamine is a metamer of methyl n-propylamine.

C. methyl n-propyl thioether is a metamer of isopropyl methyl thioether.

D. isopropylamine is a metamer of n-propylamine.

Answer: D



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3. Which of the following compounds cannot exhibit metamerism?

A. Ether

B. Carboxylic acid

C. Ester

D. ketone

Answer: B



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4. Primary amines cannot exhibit

A. Chain isomerism

B. position isomerism

C. metamerism

D. function isomerism

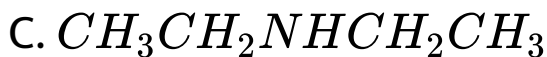
Answer: C



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5. Which of the following can exhibit metamerism?

A. CH_3OCH_3



Answer: C



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6. Which of the following is incorrect regarding tautomerism?

A. It is a special kind of functional isomericm.

B. Tautomers exist in static equilibrium with each other.

C. it arises due to the migration of a hydrogen atom from one polyvalent atom to the other within the same molecule.

D. it leads to the rearrangement of linkages.

Answer: B



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7. The number of stable isomers with molecular formula $C_{20}H_{40}$ is

A. 3

B. 4

C. 5

D. 2

Answer: A



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Question Bank

1. Question Bank

A. two

B. three

C. four

D. five

Answer: B



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2. But-1-yne and buta-1,3-diene are examples of

A. position isomers

B. chain isomers

C. functional isomers

D. metamers

Answer: C



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3. Isomers are different compounds that have the same

A. molecular structure

B. molecular shape

C. molecular formula

D. molecular properties

Answer: C



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4. Constitutional isomers are isomers that differ because

A. they have different numbers of atoms

B. they have different kinds of atoms

C. they have different arrangement of their
atoms in space

D. their atoms are connected in a different order

Answer: D



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5. Two constitutional isomers which exist together in equilibrium at room temperature are called

A. rotamers

B. conformers

C. tautomers

D. mesomers

Answer: C



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6. Pentan-2-one and 3-methylbutanone are a pair of isomers.

A. stereo

B. position

C. functional

D. chain

Answer: D



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7. n-Pentane and 2-methylbutane are a pair of

A. stereoisomers

B. diastereomers

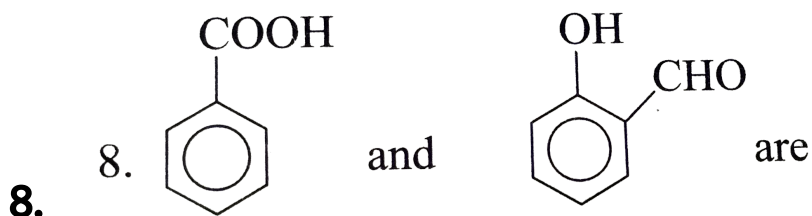
C. constitutional isomers

D. enantiomers

Answer: C



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A. Chain isomers

B. functional isomers

C. position isomers

D. stereoisomers

Answer: B



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9. Which of the following are isomers ?

A. Methyl alcohol and dimethyl ether

B. propanoic acid and propanone

C. acetone and propanone

D. ethyl alcohol and dimethyl ether

Answer: D



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10. Which of the following is an isomer of propanal?

A. Propionic acid

B. Propanol

C. Propanone

D. Propane

Answer: C



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11. The isomers that can be interconverted through rotation around a single bond are:

A. Enantiomers

B. conformes

C. diasstereomers

D. position isomers

Answer: B



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12. Which of the following pairs of compounds are chain isomers?

A. n-Butyl alcohol and s-butyl alcohol

B. isobutyl alcohol and t-butyl alcohol

C. s-butyl alcohol and t-butyl alcohol

D. n-propyl alcohol and isompropyl alcohol

Answer: C



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13. How many pairs of chain isomers are possible for $C_4H_{16}Cl$?

A. 4

B. 3

C. 2

D. 1

Answer: C



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14. The total number of benzene derivatives having the molecular formula C_7H_7Br is

A. 5

B. 4

C. 2

D. 3

Answer: B



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15. How many trichloro derivatives are possible for cyclopentane?

A. four

B. five

C. seven

D. six

Answer: A



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16. Ethylidene dichloride and ethylene dichloride are

A. chain isomers

B. position isomers

C. functional isomers

D. metamers

Answer: B



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17. The total number of benzene derivatives corresponding to the molecular formula C_6H_3Cl is

A. 3

B. 4

C. 5

D. 2

Answer: A



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18. Which of the following pairs of compounds are not isomers?

A. Propan-1-ol and methoxyethane

B. Propene and cyclopropene

C. propyne and propadiene

D. propyne and cyclopropene

Answer: B



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19. Out of the five isomeric hexanes, the isomer that can give two monochlorinated compounds is:

A. n-hexane

B. 2,2-dimethylbutane

C. 2,3-dimethylbutane

D. 2-methylpentane

Answer: C



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20. Structural isomers C_2H_5OH and

CH_3OCH_3 have the same value of

A. boiling points

B. heat of vaporization

C. gaseous densities at the same temperature and pressure

D. vapor pressure at the same temperature

Answer: C



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21. The number of ether metamers represented by the formula $C_4H_{10}O$ is

A. 2

B. 3

C. 4

D. 1

Answer: B



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22. The number of possible structural isomers of $C_4H_{10}O$ is

A. 7

B. 8

C. 6

D. 5

Answer: A



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23. The total number of possible isomeric trimethylbenzenes is

A. 6

B. 4

C. 2

D. 3

Answer: D



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24. The enolic form of acetone contains:

A. 9 sigma bonds, 2 pi bonds, and 1 lone pair

B. 10 sigma bonds, 1 pi bond, and 1 lone pair

C. 9 sigma bonds, 1 pi bond, and 2 lone pairs

D. 8 sigma bonds, 2 pi bonds, and 2 lone pairs

Answer: C



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25. How many constitutional isomers are possible for the arene C_9H_{12} ?

A. Eight

B. Seven

C. Six

D. Five

Answer: A



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26. The number of possible structural isomers of $C_4H_{10}O$ is

A. Eight

B. Six

C. Seven

D. Five

Answer: C



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27. The number of aromatic structures possible for the molecular formula C_7H_8O is

A. 5

B. 4

C. 7

D. 9

Answer: A



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28. A molecule of urea can show

A. optical isomerism

B. geometrical isomerism

C. tautomerism

D. position isomerism

Answer: C



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29. Total number of ethers possible with the molecular formula $C_5H_{12}O$ exhibiting constitutional isomerism is

A. 6

B. 5

C. 4

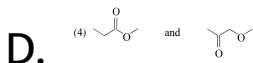
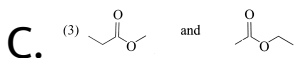
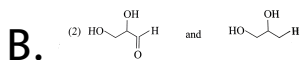
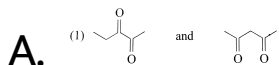
D. 7

Answer: A



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30. Which of the following pairs of compounds are functional isomers?

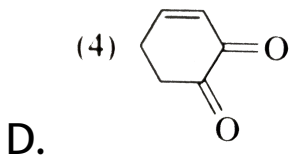
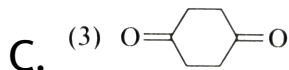
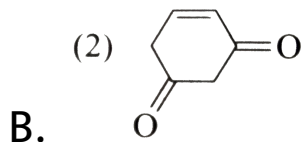
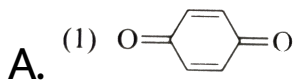


Answer: D



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31. Which of the following does not exhibit tautomerism?



Answer: A



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32. The number of carboxylic esters with the formula $C_5H_{10}O_2$ exhibiting constitutional isomerism is

A. nine

B. eight

C. ten

D. seven

Answer: A



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33. The total number of dimethylphenols having the molecular formula $C_8H_{10}O$ is

A. 8

B. 5

C. 6

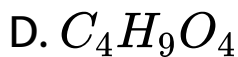
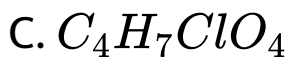
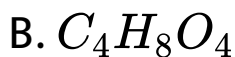
D. 7

Answer: C



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34. Which one of the following formular does not represents an organic compound?



Answer: D



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35. Only two isomeric monochloro derivatives are possible for

A. (i),(ii)

B. (i),(iv)

C. (i),(ii),(iii)

D. (i),(ii),(iii),(iv)

Answer: B



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36. Keto-enol tautomerism is observed in

A. (i),(ii),(iii),(iv)

B. (i),(ii),(iii)

C. (ii),(iv)

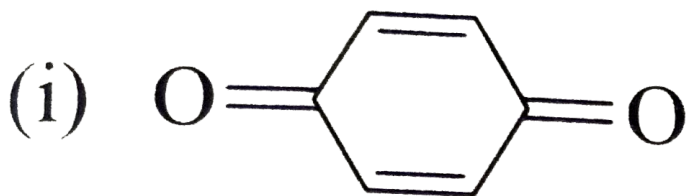
D. (ii),(iii)

Answer: C

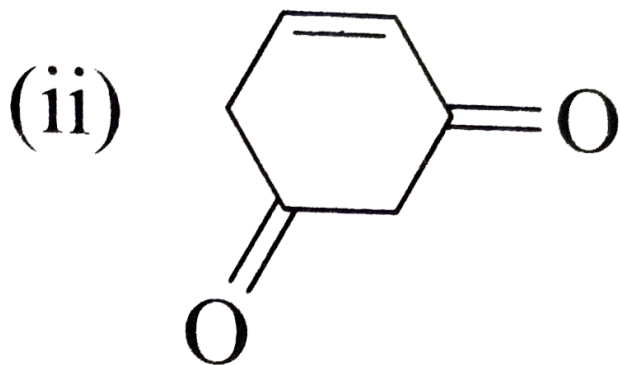


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37. Tautomerism is exhibited by

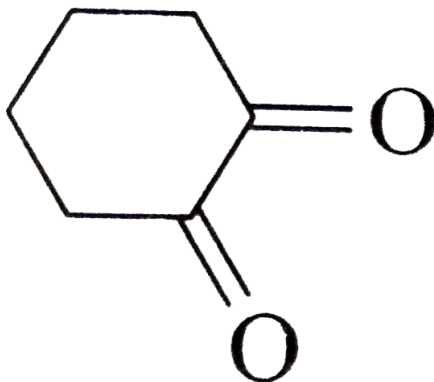


(i)

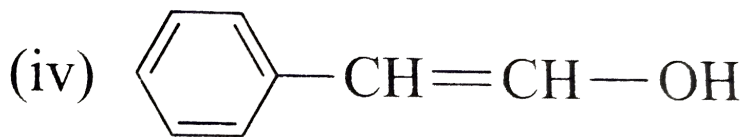


(ii)

(iii)



(iii)



(iv)

A. (ii),(iii),(iv)

B. (i),(ii),(iii),(iv)

C. (i),(iii),(iv)

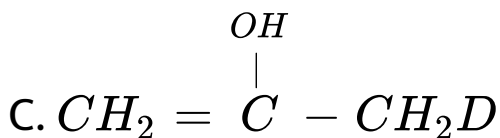
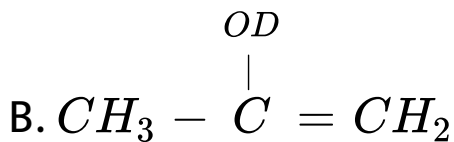
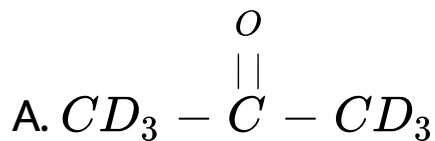
D. (i),(ii),(iii)

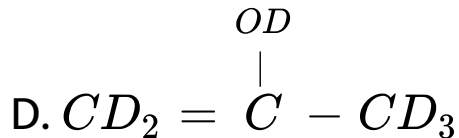
Answer: A



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38. The enol form of acetone after treatment with D_2O gives:





Answer: B



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39. Which of the following has the most acidic hydrogen ?

A. Hexane-2,3-dione

B. Hexane-2,5-dione

C. hexane-3-one

D. Hexane-2,4-dione

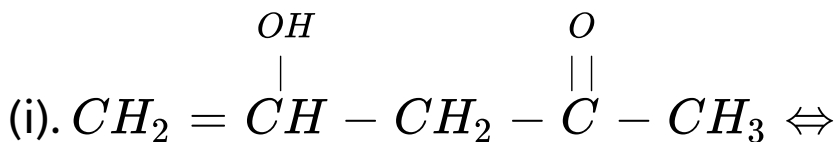
Answer: D

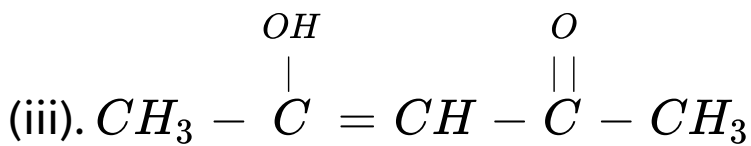
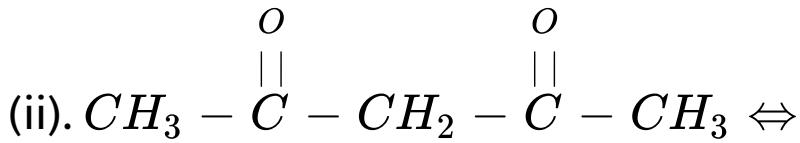


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Archives

1. The order of stability of the following tautomeric compounds is





A. $(iii) > (ii) > (i)$

B. $(ii) > (i) > (iii)$

C. $(ii) > (iii) > (i)$

D. $(i) > (ii) > (iii)$

Answer: A



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2. Which isomer of hexane has only two different sets of structurally equivalent hydrogen atoms?

A. 2,2-dimethylbutane

B. 2-methylpentane

C. 3-methylpentane

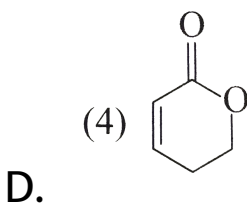
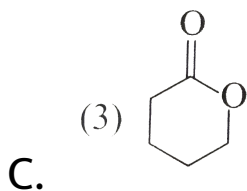
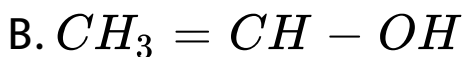
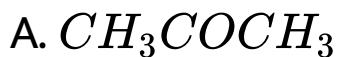
D. 2,3-dimethylbutane

Answer: D



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3. Which one of the following compounds cannot show tautomerism?



Answer: D



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4. How many primary amines including stereoisomers are possible for the molecular formula $C_4H_{11}N$.

A. 1

B. 2

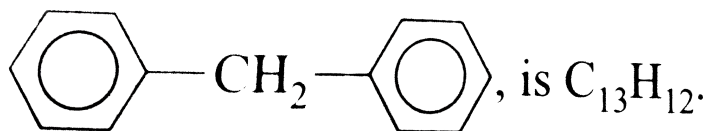
C. 3

D. 4

Answer: D



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The molecular formula of diphenylmethane, $C_{13}H_{12}$, is given. How many structural isomers are possible when one of the hydrogen atoms is replaced by a chlorine atom?

A. 8

B. 7

C. 4

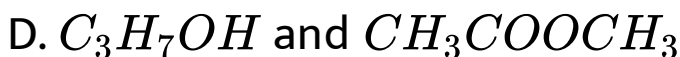
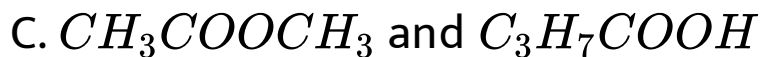
D. 6

Answer: C



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6. Isomers of propionic acid are



Answer: A



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7. The compound which is not isomeric with diethyl ether is :

A. n-propyl methyl ether

B. 1-butanol

C. 2-methyl-2-propanol

D. butanone

Answer: D



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8. Cyanides and isocyanides are isomers of the type

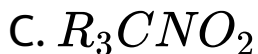
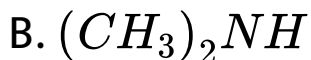
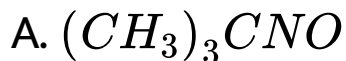
- A. position isomers
- B. tautomers
- C. functional isomers
- D. none of these

Answer: C



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9. Tautomerism will be exhibited by



Answer: D



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10. n-Propyl alcohol and isopropyl alcohol are examples of

- A. position isomerism
- B. chain isomerism
- C. tautomerism
- D. geometrical isomerism

Answer: A



11. The number of isomers of C_6H_{14} is:

A. 6

B. 3

C. 4

D. 5

Answer:



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