



## CHEMISTRY

### BOOKS - CBSE COMPLEMENTARY MATERIAL CHEMISTRY (HINGLISH)

#### HYDROCARBONS

#### Multiple Choice Questions

1. Which of the following compound has zero dipole moment?

A. cis - But - 2 -ene

B. trans - But - 2 -ene

C. But - 1 - ene

D. 2 - Methylprop - 1 - ene

**Answer: B**

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2. Bond length of ethane (I), ethene (II), acetylene (III) and benzene (IV) follows the order

A.  $I > II > III > IV$

B.  $I > II > IV > III$

C.  $I > IV > II > III$

D.  $III > IV > II > I$

**Answer: C**



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**3. The methyl group in benzene ring is :**

- A. Ortho directing
- B. Ortho and meta directing
- C. Para directing
- D. Ortho and para directing

**Answer: D**



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4. The dihedral angle between the hydrogen atoms of two methyl groups in staggered conformation of ethane is

A.  $120^\circ$

B.  $60^\circ$

C.  $0^\circ$

D.  $90^\circ$

**Answer: B**



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5. On heating  $C_2H_2$  in red hot copper tube, the compound formed is :

A. Ethylene

B. Benzene

C. Ethane

D. Methane

**Answer: B**



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**6. Action of acetylene on dilute  $H_2SO_4$  gives**

A. Acetic acid

B. Acetone

C. Acetaldehyde

D. Ethyl alcohol

**Answer: C**



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7. Which of the following compounds will exhibit trans (geometrical) isomerism ?

A. Butanol

B. 2-Butyne

C. 2-Butenol

D. 2-Butene

**Answer: D**



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8. Hydrolysis of ozonide of but-1-ene gives

A. Ethylene only

B. Acetaldehyde and formaldehyde

C. Propionaldehyde and formaldehyde

D. Acetaldehyde only

**Answer: C**



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9. Reaction of hydrogen bromide with propene in the absence of peroxide is a/an

- A. free radical reaction
- B. nucleophilic substitution
- C. electrophilic addition
- D. nucleophilic substitution

**Answer: C**

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**10.** Among the following compounds the one that is most reactive towards electrophilic nitration is

- A. Benzoic acid
- B. Nitrobenzene
- C. Toluene



## D. Benzene

**Answer: C**

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## Fill In The Blanks

1. Alkanes mainly exhibit \_\_\_\_\_ reaction .

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2. Halogenation of alkanes does not occur in .....

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3. The H - C -H bond angle in ethene is .....

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4. The addition of HBr to an unsymmetrical alkene takes place in accordance with ..... Rule.

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5. Bayer's reagent is used for testing .....

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6. Benzene favours ..... Substitution reaction.



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7. The Dipole moment of Benzene is .....



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8. The nitro group in the benzene nucleus is ..... Directing.  
It ..... The reactivity of the benzene ring.



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9. Melting point and boiling point increase as the molar masses .....



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10. The reaction of solid calcium carbide with water produces ....., a flammable gas.

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### True And False Type Question

1. Alkanes mainly undergo substitution reactions using the free - radical mechanism.

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2. Arrange the following in the decreasing order of boiling points

(i) n-Pentane (ii) Iso-pentane (iii) Neo-pentane

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3. The acidic character of three types of hydrocarbons follows the order alkanes > alkenes > alkynes.

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4. The peroxide effect is observed in case of HBr and not with HF, HCl or HI. Give reason.

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5. Wurtz reaction is suitable of the preparation of both symmetrical and unsymmetrical alkanes.

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6. For a compound to be aromatic it must have  $(4n + 2)\pi$  electrons.

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7. Benzene has planar structure.

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8. The benzene molecule has two different carbon - carbon bond lengths, corresponding to alternate single and double bonds.

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9. In Friedel - Crafts reaction,  $AlCl_3$  is an electrophile.

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10. An electron - donating substituent in benzene ring gives a meta product.

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## Match The Columns

1. Match the statements (a, b, c, d) in column I with the statements (i, ii, iii, iv) in column II.

### Column I

- a.  $C_2H_6$
- b.  $C_2H_4$
- c.  $C_2H_2$
- d.  $C_6H_6$

### Column II

- i. Electrophilic addition
- ii. Electrophilic substitution
- iii. Free radical substitution
- iv. Free radical addition



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2. Match the statements (a, b, c, d) in column I with the statements (i, ii, iii, iv) in column II.

### Column I

- a. Alkanes
- b. Alkenes
- c. Alkynes
- d. Arenes

### Column II

- i. Saturated nature
- ii. Ozonolysis
- iii. Geometrical isomerism
- iv. Aromatic character



## Assertion Reason Type Question

1. Assertion : The IUPAC name of  $CH_3CH = CH - C \equiv CH$  is pent - 3 - en - 1 - yne and not pent - 2 en - 4 - yne.

Reason : While deciding the locants of double and triple Bonds, lowest sum rule is always followed .

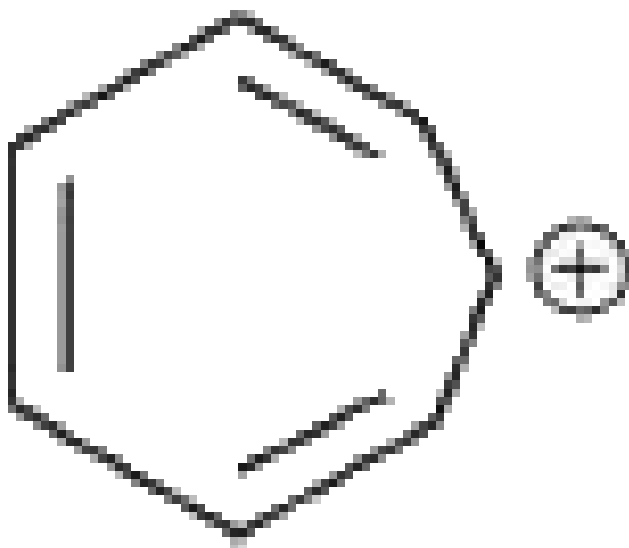
- A. If both assertion and reason are correct and reason is correct explanation for assertion.
- B. If both assertion and reason are correct but reason is not correct explanation for assertion.
- C. If assertion is correct but a reason is incorrect.

D. If assertion and reason both are incorrect.

Answer:

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2. Assertion : Tropylium cation



is aromatic

in character .

Reason The only property which decides the aromatic character is its planar nature.

- A. If both assertion and reason are correct and reason is correct explanation for assertion.
- B. If both assertion and reason are correct but reason is not correct explanation for assertion.
- C. If assertion is correct but a reason is incorrect.
- D. If assertion and reason both are incorrect.

**Answer:**



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3. Assertion : Fredel - craft reaction between benzene and acetic anhydride in the presence of anhydrous  $AlCl_3$  yields acetophenone and not poly - substituted products .

Reasons : Acetophenone formed poisons the catalyst preventing further reaction.

- A. If both assertion and reason are correct and reason is correct explanation for assertion.
- B. If both assertion and reason are correct but reason is not correct explanation for assertion.
- C. If assertion is correct but a reason is incorrect.
- D. If assertion and reason both are incorrect.

**Answer:**



4. Assertion: But-1-ene on reaction with HBr in the presence of peroxide produces 1-bromobutane.

Reason: It involves the formation of a primary free radical.

- A. If both assertion and reason are correct and reason is correct explanation for assertion.
- B. If both assertion and reason are correct but reason is not correct explanation for assertion.
- C. If assertion is correct but a reason is incorrect.
- D. If assertion and reason both are incorrect.

**Answer:**

5. Assertion : Alkanes with more than three carbon atoms exhibit chain isomerism.

Reason : Branching of the carbon atom chain is necessary for exhibiting chain isomerism.

- A. If both assertion and reason are correct and reason is correct explanation for assertion.
- B. If both assertion and reason are correct but reason is not correct explanation for assertion.
- C. If assertion is correct but a reason is incorrect.
- D. If assertion and reason both are incorrect.

**Answer:**





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6. Assertion : Benzene reacts with chlorine in the form of light to form BHC.

Reason : BHC is also called gammexane or 666

- A. If both assertion and reason are correct and reason is correct explanation for assertion.
- B. If both assertion and reason are correct but reason is not correct explanation for assertion.
- C. If assertion is correct but a reason is incorrect.
- D. If assertion and reason both are incorrect.

**Answer:**



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7. Statement-1: All the hydrogen atoms in  $CH_2 = C = CH_2$  lie in one plane.

Statement-2: All the carbon atoms in it are not  $sp^2$  hybridized .

- A. If both assertion and reason are correct and reason is correct explanation for assertion.
- B. If both assertion and reason are correct but reason is not correct explanation for assertion.
- C. If assertion is correct but a reason is incorrect.
- D. If assertion and reason both are incorrect.

**Answer:**







8. Assertion : Propene reacts with  $HBr$  in presence of benzoyl peroxide to yield 1 – bromopropane.

Reason : In presence of peroxide, the addition of  $HBr$  to propene follows ionic mechanism.

- A. If both assertion and reason are correct and reason is correct explanation for assertion.
- B. If both assertion and reason are correct but reason is not correct explanation for assertion.
- C. If assertion is correct but a reason is incorrect.
- D. If assertion and reason both are incorrect.

**Answer:**



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## One Word Type Question

1. What is the state of hybridisation of Carbon atoms in alkanes ?



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2. What is self linking property of atoms called ?



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3. What is the general formula of alkene ?

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4. What is the other name for Geometrical isomerism?

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5. Which out of Ethane, Ethene and Ethyne has longest C - C bond ?

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6. What is the number of  $\sigma$  and  $\pi$  bonds in But - 3 - en - 1 - yne?

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7. Propyne is treated with aqueous  $H_2SO_4$  in the presence of  $HgSO_4$ . The product formed is

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8. The  $C - C - C$  bond angle in benzene is

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9. Name the product formed when benzene reacts with  $CH_3Cl$  in the presence of anhydrous aluminium chloride.

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10. – $COOH$  is ortho, para directing or Meta directing group ?

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### 1 Mark Question

1. Name the chain isomer of  $C_5H_{12}$  which has tertiary carbon atom.

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2. Give the IUPAC name of the alkane having the lowest molecular mass that contain a quaternary carbon.

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3. Write the reaction involved in Kolbe's electrolytic method to prepare ethane.

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4. Define term decarboxylation.

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5. Why dry ether and not water is used as a solvent in the preparation of alkane by Wurtz reaction ?

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6. Sodium salt of which acid will be needed to prepare propane by decarboxylation?

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7. Complete the following reaction :  $CH_3Cl + Na \xrightarrow{\text{dry ether}}$

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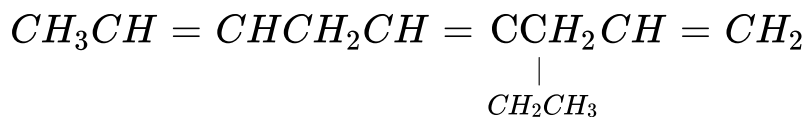
8. Amongst the following which one has the maximum boiling point ? N-Pentane, iso - pentane, neo - pentane.

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9. Define conformations.

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10. Write IUPAC name of



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11. Draw the cis and trans isomers of  $\text{CHCl} = \text{CHCl}$ .

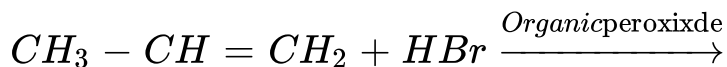
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12. What happens when 2- Bromobutane is being treated with alc. KOH ?

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13. Complete the following reaction :



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14. An alkene 'A' on ozonolysis gives a mixture of ethanal and pentan-3-one. Write structure and IUPAC name of 'A'.

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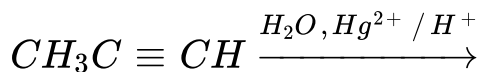
15. When alkyne is treated with bromine water then what will be the colour of the product

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16. Why do alkynes not show geometrical isomerism ?

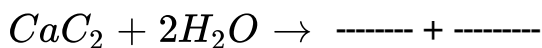
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17. Complete the following reaction :



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18. Complete the following reaction :



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19. How will you convert ethyne to benzene ?

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20. Write chemical equation for combustion reaction of Hexyne.

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21. Write IUPAC name of



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22. Why is benzene extra ordinarily stable though it contains three double bonds?

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23. Write chemical reaction to exemplify Friedel - Crafts alkylation of benzene.

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24. What is the nature of substitution in benzene ?

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25. Why is  
not aromatic ?

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26. C - C bond length in benzene is intermediate between C - C and C = C why ?

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27. Starting from benzene, how would you synthesize m - Bromonitrobenzene.

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28. Give one example each of o, p - directing group and m - directing group.

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29. Complete the reaction



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30. The electrophile involved in the nitration of benzene is

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## 2 Mark Question

1. What is the effect of branching on melting and boiling points of alkanes ?

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2. What is the difference between isomers and conformers?

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3. Is it possible to isolate pure staggered ethane or pure eclipsed ethane at room temperature?

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4. Draw Newman projection formula for conformations of ethane.

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5. How will you convert methyl bromide to ethane ?

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6. Wurtz reaction cannot be used for the preparation of unsymmetrical alkanes ? Give reason

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7. How can ethene be prepared from

Ethanol

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8. How can ethene be prepared from

Ethyl bromide ?

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9. Melting point of cis - But - 2 - ene is lower than that of trans - But - 2 - ene. Give reason .

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10. Draw the structures of cis and trans Hex -2 - ene.

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11. Explain with the help of equation : Ozonolysis of propene.

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12. Give a chemical test to distinguish between ethane and ethene.

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13. What do you understand by peroxide effect (Kharasch effect) ?

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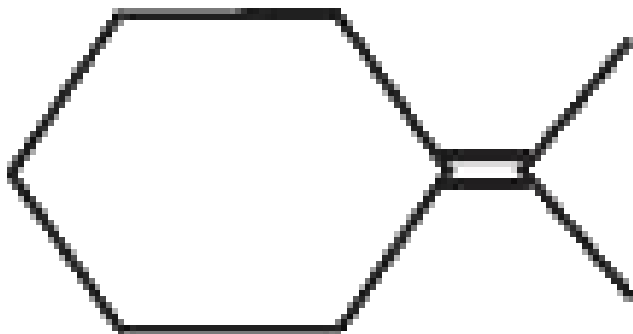
14. What factor determines the stability of alkene ?

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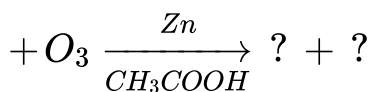
15. Arrange the following alkenes in decreasing order of stability :



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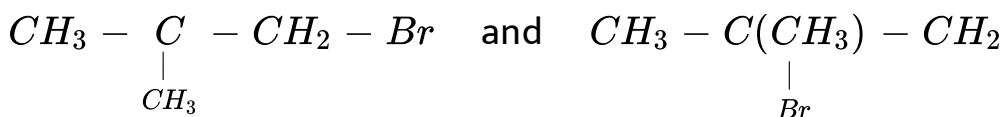


16.



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17. An alkene on treatment with HBr in presence of peroxide can generate two types of free radicals



Predict the final product of the reaction and give reason.

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**18.** What happens when But - 2 - ene reacts with acidified potassium permanganate solution ?

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**19.** You are provided with But - 2 - yne, how will you convert it into :

cis - But - 2 - ene

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**20.** You are provided with But - 2 - yne, how will you convert it into :

trans - But - 2 - ene

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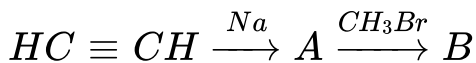
21. An alkene  $C_4H_8$  reacts with HBr both in the presence and absence of peroxide to give the same product. Identify the alkene.

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22. Arrange ethane, ethene and ethyne in the order of increasing acidity.

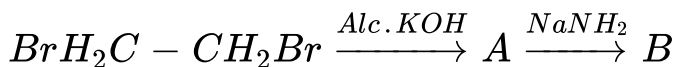
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23. Write the structures of the products A and B of the following reactions :



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24. Write the structures of the products A and B of the following reactions :



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25. Give a chemical test to distinguish between ethyne and ethene.







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26. Out of benzene and toluene, which undergo nitration easily and why ?



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27. Why does presence of a nitro group make the benzene ring less reactive in comparison to the unsubstituted benzene ring . Explain .



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28. What happens when Chlorine is passed through benzene in the presence of sunlight and absence of halogen

carrier ?



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### 3 Mark Question

1. Write the structures and names of products obtained in the reactions of sodium with a mixture of 1-iodo-2-methylpropane and 2-iodopropane.



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2. State Markownikov's rule. Using this rule, write the reaction of propene with

HCl

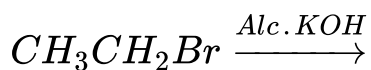
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3. State Markownikov's rule. Using this rule, write the reaction of propene with



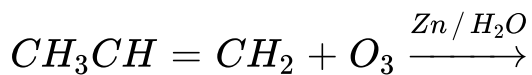
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4. Complete the following reactions :



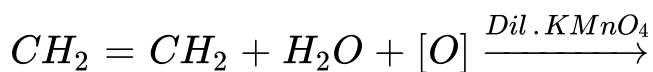
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5. Complete the following reactions :



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6. Complete the following reactions :



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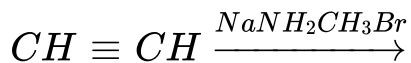
7. Write the structure of 3, 4 Dimethylhept - 3 - ene.

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8. Name the compounds obtained by ozonolysis of 3 - Methylpent - 2 - ene.

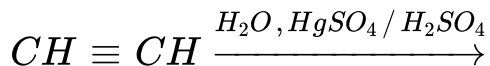
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9. Complete the following reactions :



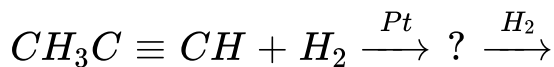
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10. Complete the following reactions :



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11. Complete the following reactions :



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12. Write the mechanism of nitration of benzene.

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13. Arrange in the order of decreasing relative reactivity with an electrophile and explain Toluene, p - Nitrotoluene, 1, 4 - Dinitrobenzene

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14. What is meant by delocalization of  $\pi$  electrons ? How does it affect stability of benzene ?

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15. What are the conditions for a compound / species to be aromatic according to Huckel 's rule ?

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16. How will you convert benzene into Acetophenone

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17. How will you convert benzene into  
m - Chloronitrobenzene ?

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### 5 Mark Question

1. Define isomerism. Write all the structural isomers of hexane ( $C_6H_{14}$ ) and arrange them in increasing order of boiling points.

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2. Write short note on

Wurtz reaction

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3. Write short note on

Kolbe's electrolysis

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4. Write short note on

Ozonolysis

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5. Alkenes show geometrical isomerism while alkanes do not. Give a suitable explanation.

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6. An alkene 'A' of molecular mass '28u' on treatment with bromine gives a product 'B'. The compound 'B' on further dehalogenation with zinc gives back 'A'. Give the structures of 'A' and 'B' and also the sequence of reactions.

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7. An organic compound A with formula  $C_4H_9Br$  on treatment with alcoholic KOH gave two isomeric compounds "B" and "C" with formula  $C_4H_8$ . On ozonolysis, "B" gave only

one product  $CH_3CHO$  while C gave two different products. Identify the compounds A, B, and C

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8. How will you convert Ethyne into  
1, 1, 2, 2 - Tetrachloroethane

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9. How will you convert Ethyne into  
Ethene

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**10.** How will you convert Ethyne into  
Ethanal

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**11.** How will you convert ethyne to benzene ?

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**12.** How will you convert Ethyne into  
Sodium ethynide

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13. Discuss the structure of benzene with an emphasis on resonance and orbital pictures.

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## Unit Test

1. Amongst the following which one has the maximum boiling point ? N-Pentane, iso - pentane, neo - pentane.

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2. What is the number of  $\sigma$  and  $\pi$  bonds in But - 3 - en - 1 - yne?

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3. Action of acetylene on dilute  $H_2SO_4 / dil. HgSO_4$  gives:

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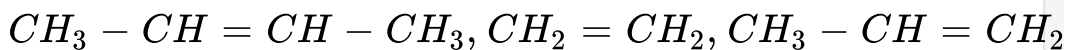
4. An alkene 'A' on ozonolysis gives a mixture of ethanal and pentan-3-one. Write structure and IUPAC name of 'A'.

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5. The nitro group in the benzene nucleus is \_\_\_\_\_ directing.  
It \_\_\_\_\_ the reactivity of the benzene ring.

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6. Arrange the following alkenes in decreasing order of stability :



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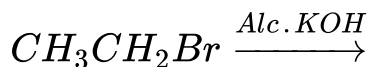
7. Give a chemical test to distinguish between ethyne and ethene.

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8. Melting point of cis - But - 2 - ene is lower than that of trans - But - 2 - ene. Give reason .

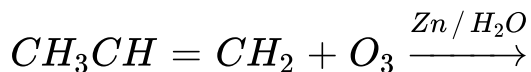
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9. Complete the following reactions :



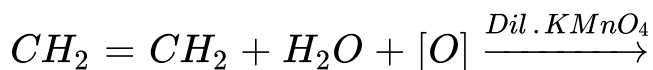
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10. Complete the following reactions :



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11. Complete the following reactions :



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12. What are the conditions for a compound / species to be aromatic according to Huckel 's rule ?

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**15.** Why is benzene extra ordinarily stable though it contains three double bonds?

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**16.** How can we convert ethyne into benzene ?

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