



CHEMISTRY

BOOKS - V PUBLICATION

HYDROCARBONS

Question Bank

1. How do you account for formation of ethane during chlorination of methane?



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2. For the following compounds, write structural formulae and IUPAC names for all possible isomers having number of double or triple bonds as indicated : a. 'C₄H₈' (one double bond)

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3. Write the IUPAC names of the products obtained by the ozonolysis of the following compounds : Pent-2-ene

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



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5. An alkene 'A' contains $3 C - C$, $8C - H\sigma$ bonds and $1C - C\pi$ bond. 'A' on ozonolysis gives two moles of an aldehyde of molar mass 44u. Write the IUPAC name of 'A'



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6. Propanal and pentan-3-one are the ozonolysis products of an alkene. What is the structural formula of alkene?



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7. Write chemical equations of combustion reaction of the following hydrocarbons. i. Butane



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8. Draw the cis and trans structures of hex-2-ene. Which isomer will have higher b.pt. and why?



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9. Why is benzene extraordinarily stable though it contains three double bonds



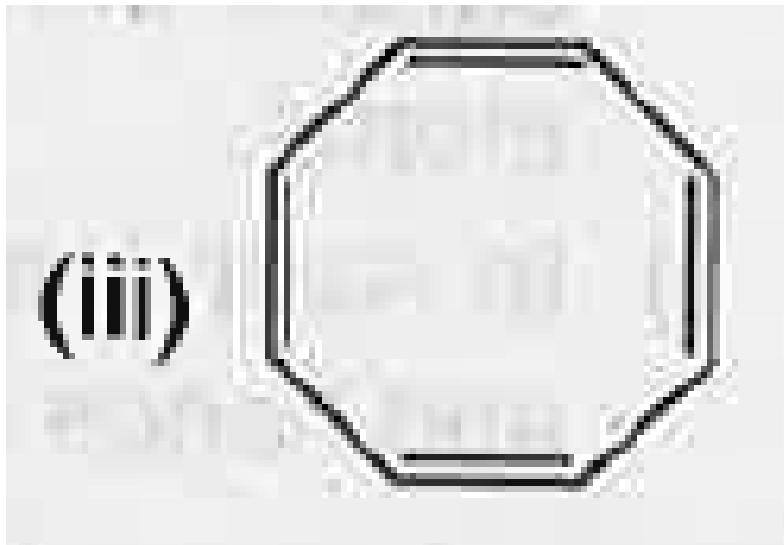
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10. What are the necessary conditions for any compound to show aromaticity?



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11. Explain why the following systems are not aromatic?



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12. How will you convert benzene into

i. p-nitrobromobenzene

ii. m-nitrochlorobenzene

iii. p-nitrotoluene

iv. acetophenone.



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13. In the alkane,

$H_3CCH_2C(CH_3)_2CH_2CH(CH_3)_2$, identify 1° ,

2° , 3° carbon atoms and give the total number of

atoms bonded to each one of these



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14. What effect does branching of an alkane chain has on,its boiling point?

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15. Addition of HBr to propene yields 2-Bromopropane, while in the presence of Benzoyl peroxide. The same reaction Yields 1-Bromopropane. Give reason. Justify your answer.

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16. Write down the products of ozonolysis 1,2 - dimethylbenzene (o-xylene). How does the result support Kekule's structure for benzene ?

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17. Arrange benzene, n-hexane and ethyne in the decreasing order of acidic behaviour. Also give reason for this behaviour.

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18. Why does benzene undergo electrophilic substitution reactions easily and nucleophilic substitution with difficulty?



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19. How would you convert the following compounds to benzene? i. Ethyne

ii. Ethene

iii. Hexane



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20. Write structures of all the alkenes which on hydrogenation give 2-methylbutane.

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21. Arrange the following set of compounds in order of their decreasing relative reactivity with an electrophile, E^+

a. Chlorobenzene, 2,4-dinitrochlorobenzene, *p*-nitrochlorobenzene

b. Toluene,

p- $CH_3-C_6H_4-NO_2$, *p*- $O_2N-C_6H_4-NO_2$

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22. Three compounds are given. Benzene, m-dinitrobenzene and toluene. Identify the compound which will undergo nitration most easily and why?



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23. Suggest name of another Lewis acid other than anhydrous aluminium chloride which can be used during ethylation of benzene.



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24. Why is Wurtz reaction not preferred for preparation of alkanes containing odd number of carbon atoms? Illustrate your answer by taking one example.



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25. You are provided with two organic compounds having the molecular formula ' C_4H_6 ' which are position isomers of each other. You are also

supplied with ammoniacal solution of cuprous chloride. How will you identify the compounds?



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26. Which compound has the higher boiling point in each of the following pairs? Substantiate your answers in regard to the difference in secondary force (attraction between molecules) in the two compounds,

- a. Heptane and Hexane
- b. Nonane and 3-methyl-octane
- c. Cyclopentane and pentane



27. Four statements about benzene molecule are given below. Of these which is the correct statement justify your answers.

- i. Because of unsaturation benzene easily undergoes addition reaction.
- ii, There are two types of C-C bonds in benzene molecule.
- iii. There is a cyclic delocalisation of 'pi' electrons in benzene
- iv. Di substitution of benzene group gives two isomeric substances.



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28. Substantiate the following arguments.

i. Methane does not react with chloride in the dark



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29. State whether the following statements are true or false.

a. In benzene, carbon uses all the three p orbitals for hybridisation.

- b. Acetylene is a tetrahedral molecule.
- c. Branched chain alkanes, alkenes and aromatic hydrocarbons have high octane numbers.
- d. Ethyne can be distinguished from ethene by using cold dilute $KMnO_4^-$
- e. In cracking, the larger molecule are broken down into smaller molecules and in reforming, cyclic and acyclic alkanes are converted into arenes.



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30. What are the relative stabilities of different conformations of ethane. Is it possible to isolate these at room temperature?



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31. What is meant by i. delocalisation ii. resonance energy.



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32. Write the structure for the compounds having the IUPAC names:

a) '2,3,5' - Trimethyl - 4 - propylheptane



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33. Draw cis and trans isomers of hex-2-ene



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34. Is the following molecule aromatic or not?

'(##VPU_HSS_CHE_XI_C13_E02_011_Q01##)'



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35. Which of the following polymerizes most readily and why?

(i) Acetylene

(ii) Ethene

(iii) Buta '-1,3' - dien



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

Explain?



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37. LPG is one of the common fuel for domestic use .

Which is the main constituent of LPG ?



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38. Why HF forms 'H' - bonding with ethyne even though it is non polar in nature?



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39. Which one of the following has the maximum number of pi bonds - propyne, butadiene, benzene?

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40. How will you detect the presence of unsaturation in an organic compound?

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41. Why do the 'C-C' bonds rather than 'C-H' bonds break during cracking of alkanes?

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42. Although benzene is highly unsaturated, it does not undergo addition reactions?

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43. Write the IUPAC names of the products obtained by the ozonolysis of the following

compounds :2-Ethyl but-1-ene



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44. What effect does branching of an alkane chain has on its melting point?



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45. What is the cause of geometrical isomerism in alkenes?



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46. Why is cyclopropane more reactive than propane?

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47. A hydrocarbon containing two double bonds gave on reductive ozonolysis ethanal, glyoxal and propanone. Predict the structure of the hydrocarbon and give its IUPAC name?

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48. How will you distinguish 1 - pentene from 'n' - pentane?

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49. Complete the following reactions? $4Al + 3O_2$

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50. How will you convert benzene into 'm' - Nitro chloro benzene?

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51. Write the IUPAC names of the following compounds $K_2[PdCl_4]$



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52. Draw the Newman's projections of the eclipsed and staggered conformations of n-butane.



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53. Draw the structures of three cycloalkane isomers with molecular formula ' C_5H_{10} ', each with a different size ring.



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54. Between the two conformational isomers of cyclohexane, ie, chair and boat forms, which one is more stable?



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55. Which of the following polymerizes most readily and why?

(i) Acetylene

(ii) Ethene

(iii) Buta '-1,3' - dien



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56. What are possible isomers of ' $C_4H_8O_2$ ' ?

Give their IUPAC names?



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57. How will you convert propyne into propanone

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58. Which hydrocarbon cannot be obtained by the Kolbe's electrolytic method?

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59. Which has a greater bond length and why? Carbon - carbon bond in ethane or carbon carbon bond in ethene?





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60. Is geometric isomerism around a triple bond possible?



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61. Why alkenes have a higher dipole moment than alkanes?



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62. Glucose and Sucrose are soluble in water but cyclohexane or benzene are insoluble in water. Explain.

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63. What type of reagents effect characteristic benzene substitution? Why is it called, electrophilic aromatic substitution?

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64. What is the difference between alkylation and acylation?

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65. What does the circle inside the benzene ring indicate?

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66. How will you convert ethyne into Benzene?

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67. Why does benzene undergo electrophilic substitution reactions easily and nucleophilic substitution with difficulty?



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68. You are provided with two organic compounds 'A' and 'B' having the molecular formula ' C_4H_6 ', which are position isomers of each other. You are also supplied with

ammoniacal solution of cuprous chloride. How will you identify 'A' and 'B' ?



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69. i. A student treated CaC_2 with water and the gas formed is passed through a red hot tube.

What will be the product?

ii. You are provided with the following substances.

a. CH_3Cl , sodium and dry ether

b. Benzene, CH_3Cl and $AlCl_3$

i. Name the products formed in each case.

ii. Name the reactions.



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70. How will you prepare ethane by Kolbe's electrolytic method?



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71. Explain the reaction between sodium metal and bromoethane in dry ether.



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72. A gas on passing through ammoniacal 'AgNO₃' solution does not give any precipitate but decolourises alkaline 'KMnO₄' solution. The gas may be C₂H₆, C₂H₄, C₂H₂, C₃H₈

A. C₂H₆

B. C₂H₄

C. C₂H₂

D. C₃H₈

Answer: B



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73. Bayer's reagent is

- A. aqueous ' KMnO_4 '
- B. neutral ' KMnO_4 '
- C. alkaline ' KMnO_4 '
- D. aqueous bromine water

Answer: C



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74. The compound which forms only acetaldehyde upon ozonolysis is: Ethene, Propyne, 1-Butene, 2 - Butene

A. Ethene

B. Propyne

C. 1-Butene

D. 2 -Butene

Answer: D



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75. In the reactions:

'(##VPU_HSS_CHE_XI_C13_E03_004_Q01##)'

- A. Chlorobenzene
- B. BHC'
- C. Hexachlorobenzene
- D. Dichlorobenzene

Answer: B



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76. An aqueous solution of compound A gives ethane on electrolysis. The compound 'A' is: Ethyl acetate Sodium acetate Sodium propionate Sodiummethoxide

- A. Ethyl acetate
- B. Sodium acetate
- C. Sodium propionate
- D. Sodiummethoxide

Answer: B



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77. The lowest alkene which is capable of exhibiting geometrical isomerism is: 1-Butene 2-Pentene 2 -Butene 2,3 - Dimethyl butene

A. 1-Butene

B. 2-Pentene

C. 2 -Butene

D. 2,3 - Dimethyl butene

Answer: C



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78. In the reaction:

'(##VPU_HSS_CHE_XI_C13_E03_007_Q01##)'

the compound 'A' is

A. Ethylene

B. Acetic acid

C. Propene

D. 1- Butene

Answer: C



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79. The compound which reacts with HBr obeying Markovinkoff's rule is $\text{CH}_2=\text{CH}_2$, $\text{CH}_3\text{CH}=\text{CHCH}_3$, $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_3$ (CH_3), $\text{C}=\text{CH}_2$

- A. $\text{CH}_2=\text{CH}_2$
- B. $\text{CH}_3\text{CH}=\text{CHCH}_3$
- C. $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_3$
- D. $(\text{CH}_3)_2\text{C}=\text{CH}_2$

Answer: A



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80. Which of the following is used as an antiknocking substance? Freon Glyoxal Tetraethyl lead Hydrogen peroxide

A. Freon

B. Glyoxal

C. Tetraethyl lead

D. Hydrogen peroxide

Answer: C



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81. When 3,3 -dimethyl -2' -butanol is heated with 'H₂ SO₄', the major product is 3,3 -dimethyl-1-butene 2,3 -dimethyl-2-butene 2,3 -dimethyl-1-butene

A. 3,3 -dimethyl-1-butene

B. 2,3 -dimethyl-2-butene

C. 2,3 -dimethyl-1-butene

D. cis and trans isomers of product named under

Answer: B





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82. Number of acidic hydrogen atoms in 1-butyne

is 1 2 3 4

A. 1

B. 2

C. 3

D. 4

Answer: A



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83. 2-Hexyne gives trans-2-hexene on treatment with Li / NH₃, Pd / BaSO₄, LiAlH₄, Pt / H₂

A. Li / NH₃

B. Pd / BaSO₄

C. LiAlH₄

D. Pt / H₂

Answer: A



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84. 2-Phenylpropène on acidic hydration gives 2-Phenyl-2-propanol 2-Phenyl-1-propanol 3-Phenyl-1-propanol 1-Phenyl-2-propanol

A. 2-Phenyl-2-propanol

B. 2-Phenyl-1-propanol

C. 3-Phenyl-1-propanol

D. 1-Phenyl-2-propanol

Answer: A



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85. Which of the following has the minimum boiling point? n' -Butane 1 - Butyne 1 - Butene 1-Isobutane

A. n' -Butane

B. 1 - Butyne

C. 1 - Butene

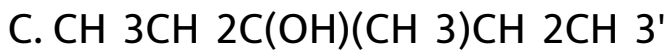
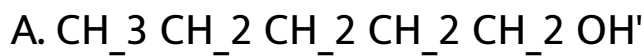
D. 1-Isobutane

Answer: A



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86. Among the following compounds which can be dehydrated very easily is $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$, $\text{CH}_3\text{CH}_2\text{CH}_2\text{-CHOH-CH}_3$, $\text{CH}_3\text{CH}_2\text{C(OH)(CH}_3\text{)CH}_2\text{CH}_3$, $\text{CH}_3\text{CH}_2\text{CH(CH}_3\text{)-CH}_2\text{CH}_2\text{OH}$



Answer: C



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87. Benzene can be obtained by heating either benzoic acid with 'X' or phenol with 'Y', 'X' and 'Y' respectively are: Zinc dust and soda-lime, Soda-lime and zinc dust, Zinc dust and sodium hydroxide, Soda-lime and copper

- A. Zinc dust and soda-lime
- B. Soda-lime and zinc dust
- C. Zinc dust and sodium hydroxide
- D. Soda-lime and copper

Answer: B



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88. The molecular formula of diphenylmethane, $C_{13}H_{12}$. How many structural isomers are possible when one of the hydrogens is replaced by a chlorine atom? 4 8 7 18

A. 4

B. 8

C. 7

D. 18

Answer: A



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89. Which of the following compounds is not aromatic?

(a)'(##VPU_HSS_CHE_XI_C13_E03_018_Q01##)'

(b)'(##VPU_HSS_CHE_XI_C13_E03_018_Q02##)'

(c)'(##VPU_HSS_CHE_XI_C13_E03_018_Q03##)'

'(##VPU_HSS_CHE_XI_C13_E03_018_Q04##)'



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90. (##VPU_HSS_CHE_XI_C13_E03_019_Q01##)'

A. CH₂ OH-CH₂ OH'

B. CH₃ COOH'

C. C₂ H₅ OH'

D. CH₃-CH₃'

Answer: A



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91. Pick out the alkane which differs from the other members of the group : 2, 2-Dimethylpropane, Pentane, 3- Methylbutane, 2,2 - Dimethylbutane

A. 2, 2-Dimethylpropane

B. Pentane

C. 3- Methylbutane

D. 2,2 - Dimethylbutane

Answer: D



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92. Among the following the aromatic compound is

(a) '##VPU_HSS_CHE_XI_C13_E03_021_Q01##'

(b)'##VPU_HSS_CHE_XI_C13_E03_021_Q02##'

(c)'##VPU_HSS_CHE_XI_C13_E03_021_Q03##'

(d)'##VPU_HSS_CHE_XI_C13_E03_021_Q04##'



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93. Photochemical chlorination is initiated by a process of (1)Pyrolysis (2)Substitution (3)Cracking (4)Homolysis

A. Pyrolysis

B. Substitution

C. Cracking

D. Homolysis

Answer: D



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94. Which of the following reagents will be able to distinguish between 1 - butyne and 2 - butyne?

NaNH_2 , HCl , O_2 , Br_2

A. NaNH_2

B. HCT

C. O_2

D. Br_2

Answer: C



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95. By passing excess ' $\text{Cl}_2(\text{g})$ ' in boiling toluene, which one of the following compounds is exclusively formed?

(a)'(##VPU_HSS_CHE_XI_C13_E03_024_Q01##)'

(b)'(##VPU_HSS_CHE_XI_C13_E03_024_Q02##)'

(c)##VPU_HSS_CHE_XI_C13_E03_024_Q03##

'(##VPU_HSS_CHE_XI_C13_E03_024_Q04##)'



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96. Power alcohol is a mixture of 80 %' peterol '+20 %' ethanol '+' small quantity of benzene 80 %' ethanol '+20 %' benzene '+' small quantity of petrol 50 %' petrol '+50 %' ethanol '+' small quantity of benzene 80 %' petrol '+20 %' benzene '+' small quantity of ethanol

A. 80 %' petrol '+20 %' ethanol '+' small
quantity of benzene

B. 80 %' ethanol '+20 %' benzene '+' small
quantity of petrol

C. 50 %' petrol '+50 %' ethanol '+' small
quantity of benzene

D. 80 %' petrol '+20 %' benzene '+' small
quantity of ethanol

Answer: A



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97. Propene on ozonolysis gives.



Answer: B



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98. The ozonolysis of an olefin gives only propanone. The olefin is but-1-ene but-2-ene 2,3 - dimethyl but '-2' - ene propene

A. but-1-ene

B. but-2-ene

C. 2,3 - dimethyl but '-2' - ene

D. propene

Answer: C



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99. Acylation of benzene to produce aliphatic aromatic ketones is known as Benzoin condensaion Hydroformylation Clemmensen reduction Friedel-Crafts' reaction

- A. Benzoin condensaion
- B. Hydroformylation
- C. Clemmensen reduction
- D. Friedel-Crafts' reaction

Answer: D



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100. Reaction of propene with dibromane followed by alkaline hydrolysis in the presence of hydrogen peroxides gives 1 - propanol 2 - propanol 1,2 - dihydroxypropane n-propane

- A. 1 - propanol
- B. 2 - propanol
- C. 1,2 -dihydroxypropane
- D. n-propane

Answer: A



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101. Benzene reacts with chlorine in sunlight to give a final product CCl_4 , $\text{C}_6\text{H}_6\text{Cl}_6$, C_6Cl_6 , $\text{C}_6\text{H}_5\text{Cl}$

A. CCl_4

B. $\text{C}_6\text{H}_6\text{Cl}_6$

C. C_6Cl_6

D. $\text{C}_6\text{H}_5\text{Cl}$

Answer: B



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102. Which of the following has the minimum boiling point? n' -Butane 1 - Butyne 1 - Butene 1-Isobutane

A. n' - butane

B. 1 -butyne

C. 1-butene

D. Iso-butene

Answer: D



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103. (##VPU_HSS_CHE_XI_C13_E03_032_Q01##)'

Identify 'A' and 'B' in the given reaction

A. C_2H_2 and CH_3CHO

B. CH_4 and $HCOOH$

C. C_2H_4 and CH_3COOH

D. C_2H_2 and CH_3COOH

Answer: A



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104. Which of the following, the unsaturated hydrocarbons are, ethyne cyclohexene n-propane ethane

A. ethyne

B. cyclohexene

C. n-propane

D. ethane

Answer: B



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105. 1-chlorobutane on reaction with alcoholic potash gives,

A. but-1-ene

B. butan-1-ol

C. but-2-ene

D. butan-2-ol

Answer: A



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106. An alkene may be converted into an alcohol by using,

A. ozone

B. lithium aluminium hydride

C. alkaline $KMnO_4$

D. hydrogen peroxide

Answer: C



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107. Ozonolysis is used to located the position of,

A. functional group

B. double bond

C. triple bond

D. aromatic character

Answer: B



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108. The compound which forms only acetaldehyde upon ozonolysis is: Ethene, Propyne, 1-Butene, 2-Butene

A. but-1-ene

B. ethene

C. but-2-ene

D. propylene

Answer: C



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109. A hydrocarbon with five carbon atoms in the molecule decolourises alkaline ' KMnO_4 ', but does not give precipitate with ammoniacal cuprous chloride solution. The hydrocarbon is, an alkene a haloalkene an alkyne an alkane

- A. an alkene
- B. a haloalkene
- C. an alkyne
- D. an alkane

Answer: C



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110. Bayer's reagent is

- A. alkaline permanganate solution.
- B. acidified permanganate solution.
- C. neutral permanganate solution
- D. aqueous bromine solution

Answer: A



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111. Anti-Markownikoff's addition of 'HBr' is not observed in, propene but-1-ene but-2-ene pent-2-ene

A. propene

B. but-1-ene

C. but-2-ene

D. pent-2-ene

Answer: C



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112. When propyne is passed through ' H_2SO_4 ' in the presence of ' HgSO_4 ', the major product is
propanal propylhydrogen sulphate acetone
propanol

A. propanal

B. propylhydrogen sulphate

C. acetone

D. propanol

Answer: C



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113. Acidic hydrogen is present in : ethyne, ethene, benzene, ethane

A. ethyne

B. ethene

C. benzene

D. ethane

Answer: C



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114. The compound that is most reactive towards electrophilic nitration is : toluene, benzene, benzoic acid, nitrobenzene

- A. toluene
- B. benzene
- C. benzoic acid
- D. nitrobenzene

Answer: A



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