CHEMISTRY

BOOKS - NAGEEN CHEMISTRY (ENGLISH)

HYDROCARBONS

Revew Exercises

1. What are hydrocarbons and how are they classified?

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2. Why is methane molecule tetrahedral in shape?

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3. How would you prepare propane from propene

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4. How would you prepare propane from propyl bromide

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5. How would you prepare propane from butanoic acid?

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6. Explain why does iso-pentane have a lower boiling point as compared to that of n-pentane?

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7. What is the limiting density of alkanes?

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8. What happens when sodium acetate is heated with sodalime

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9. What happens when ethyl bromide is treated with Zn and HCl

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10. What happens when methane is burnt in an insufficient supply of oxygen

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11. What happens when a mixture of acetylene and hydrogen is passed over heated nickel at 573 K?

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12. Name the products obtained on treating a mixture of methyl bromide and ethyl bromide with sodium in presence of ether.

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13. Explain the formation of carbon-carbon double bond in ethene.

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14. Write all the possible isomers of C_4H_8

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15. Give the IUPAC name of the following alkenes :

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16. Give the IUPAC name of the following alkenes :

$CH_2 = CH - CH = CH_2$

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17. Give the IUPAC name of the following alkenes :

$$CH_3 - \overset{CH_3}{\underset{|}{C}}\ H - \overset{CH_3}{\underset{|}{C}} = CH - \overset{CH_3}{\underset{|}{C}}\ H - CH_3$$

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18. Give the IUPAC name of the following alkenes :

$(CH_3)_2C = C(CH_3)_2$

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19. Which of the following can show geometrical isomerism?

(i) Propene (ii) But-1-ene (iii) But-2-ene (iv) Pent-2-ene

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20. Explain why alkanes and alkynes are unable to show geometrical isomerism

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21. Explain why cis-isomer is less stable as compared to trans isomer

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22. Explain why cis and trans isomers do not change into one another under ordinary conditions?

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23. Explain why compounds of the type aaC=Cab are unable to exhibit geometrical isomerism?

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24. How would you prepare ethene from ethyl iodide

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25. How would you prepare ethene from ethylene dibromide

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26. How would you prepare ethene from ethanol

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27. The reductive ozonolysis of an alkene gives a mixture of acetone and formaldehyde. What is the structural formula of the alkene?

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28. How would you identify the position of double bond in a given unknown butene by reductive ozonolysis?

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29. What happens when isopropyl bromide is heated with alcoholic KOH

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30. What happens when Pent-2-ene reacts with HBr

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31. What happens when ethene is treated with chlorine water

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32. What happens when 2-methyl propene is heated with a concentrated solution of $KMnO_4$

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33. Give the IUPAC names of the following alkynes :

$$CH_3 - C \equiv C - \overset{C_2H_5}{\underset{|}{C}} H - CH_3$$

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34. Give the IUPAC names of the following alkynes :

$$CH_3 - C \equiv C - \overset{CH_3}{\underset{|}{C}} H - CH_2 - CH_2CH_3$$

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35. Give the IUPAC names of the following alkynes :

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36. Give the IUPAC names of the following alkynes :

$$CH \equiv C - CH_2 - \overset{CH_3}{\underset{|}{C}} H - C \equiv CH$$

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37. What are the states of hybridisation of carbon atoms forming a triple bond?

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38. Why is acetylene molecule linear?

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39. What type of isomerism is shown by But-2-yne and But-1, 3-diene?

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40. Write the possible isomers with molecular formula C_5H_8 .

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41. How would you prepare acetylene from CaC_2

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42. How would you prepare acetylene from Chloroform

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43. How would you prepare acetylene from 1, 2-dibromoethane

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44. How would you obtain Acetaldehyde compounds from acetylene?

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45. How would you obtain Ethylene compounds from acetylene?

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46. How would you obtain Lewisite compounds from acetylene?

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47. Which of the following alkynes show acidic charater?

(i) Propyne (ii) But-1-yne (iii) But-2-yne (iv) Pent-2-yne

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48. What happens when acetylene is treated with hypochlorous acid

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49. What happens when acetylene is passed in a dilute solution of H_2SO_4 containing $HgSO_4$

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50. What happens when Baeyer's reagent reacts with acetylene

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51. What happens when Propyne is passed through a red hot iron tube?

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52. Name the monomers which constitute the Teflon polymers.

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53. Name the monomers which constitute the Vinyl acetylene polymers.

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54. Name the monomers which constitute the Oron polymers.

Watch Video Solution

55. What are arenes? Give two examples.

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56. Discuss the orbital structure of benzene.

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

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58. Explain the resonance structure of benzene. What do you understand by resonance hybrid?

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59. Write the possible isomers of the C_7H_8

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60. Write the possible isomers of the $C_6H_4(OH)_2$

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61. Write the possible isomers of the $C_6H_4(CH_3)_2$

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62. How would you account for the fact that C-C bond length in benzene is intermediate to that of C-C and C=C bonds?

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63. Which of the following does not satisfy Huckel's rule?

(a) Benzene (b) 1, 3-cyclobutadiene (c) Naphthalene (d) Furan

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64. Why are naphthalene and anthracene regarded as aromatic compounds?

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65. Explain the following reactions withan example for each :

(i) Reimer-Tiemann reaction

(ii) Friedel - Crafts reaction.

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66. Complete the reaction :

$$C_6H_5COONa \xrightarrow[\text{heat}]{\text{sodalime}} A \xrightarrow[AlCl_3]{C_2H_5Cl} B$$

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67. Complete the reaction :

$$C_6H_6 + HNO_3 \xrightarrow{H_2SO_4} A$$

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68. Explain why are electrophilic substitution reactions the most characteristic reactions of benzene?

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69. What happens when benzene is treated with ozone and the product is subjected to hydrolysis

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70. What happens when toluene is heated with acidified $KMnO_4$

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71. What happens when phenol is heated with zinc dust

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72. What happens when benzene is treated with acetyl chloride in the presence of anhydrous $AlCl_3$

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73. What happens when benzene is treated with a mixture of concentrated HNO_3 and concentrated H_2SO_4?

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74. Explain, why does benzene not undergo addition reactions easily?

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75. What products are obtained on the destructive distillation of coal ? How are aromatic compounds isolated from coal tar? Describe in detail.

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76. What are the main constituents of coal tar?

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77. Sort out the o- and p- and m-directing groups among the following:

$-CN, OH, \ -CH_3, \ -SO_3H, \ -CHO$

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78. What do you understand by the directive influence of a group?

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79. Out of -OH and $-NO_2$ groups, which deactivates the benzene ring and why?

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80. Why does $-NH_2$ group directs the incoming group at the ortho and para positions of the ring?

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81. How is benzene prepared in the laboratory? Write a note on its electrophilic substitution reactions.

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Very Short Answer Tyep Questions

1. Name the elements present in hydrocarbons.

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2. Why are alkanes referred to as paraffins?

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3. What are the general formulae for monocyclic and bicyclic cycloalkanes ?

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4. What is the shape of a methane molecule ?

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5. How many types of H atoms are present in isobutane?

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6. What type of hybridisation is involved in the formation of the $C-C$ bond?

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7. What type of hybridisation is involved in the formation of the $C=C$ bond?

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8. What type of hybridisation is involved in the formation of the $C \equiv C$ bond?

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9. Can 2-pentene show geometrical isomerism ?

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10. Define cracking and give an example.

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11. Name the alkanes with octane numbers 0 and 100.

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12. Out of a straight chain alkane and a straight chain alkene having the same number of carbon atoms, which has a higher octane number?

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13. What is leaded gasoline?

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14. What is cetane number?

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15. Name the metal that is always present in a Grignard reagent.

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16. What do you understand by decarboxylation of an acid ?

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17. What is the role of CaO in sodalime ?

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18. What type of forces do exist between the molecules of alkanes in liquid and solid states ?

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19. Among all the isomers of pentane which has the lowest boiling point ?

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20. Why do alkanes not dissolve in water but dissolve in benzene?

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21. What do you understand by nitration ? Give an example.

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22. How would you convert n-butane to iso-butane?

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23. What are vicinal dihalides? Give an example.

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24. How is vanaspati ghee prepared from edible oils ?

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25. Name the rule that is observed during the addition of an unsymmetrical molecule to an unsymmetrical alkene.

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26. What is Baeyer's reagent ?

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27. What is the monomer unit present in teflon ?

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28. How would you prepare propyne from acetylene ?

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29. Which of the following does possess acidic character?

(i) Butane (ii) But-1-ene (iii) But-1-yne (iv) But-2-yne

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30. What is the general formula of Grignard reagents ?

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31. What is the value of H-C-H bond angle in ethylene?

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32. What type of addition reactions do alkenes usually undergo ?

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33. Name the product obtained on addition of a water molecule of propene in the presence of dil. H_2SO_4

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34. Name the products obtained on the reductive ozonolysis of 2-methylbut-2-ene.

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35. What is the state of hybridisation of carbon atoms in benzene?

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36. How many electrons are present in the delocalised pi-molecular orbital of benzene?

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37. How many re-electrons must a ring system possess in order to exhibit aromatic behaviour ?

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38. Can 1-methylnaphthalene show position isomerism ?

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39. What is the directive influence of $-NH_2$ group?

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40. What is the percentage of carbon in anthracite ?

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41. What are the main constituents of light oil fraction of coal tar?

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42. Name the product obtained on distillation of phenol with zinc.

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43. What type of flame is given by benzene on burning?

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44. What type of substitution reactions are shown by benzene?

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45. Name a substance which acts as halogen carrier during the chlorination of benzene.

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46. Which electrophile does carry out the nitration of benzene?

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47. Name the catalyst used in Friedel-Crafts reactions,

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Short Answer Tyep Questions

1. Discuss the classification of hydrocarbons. Give two examples of each type.

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2. Explain why are alkanes referred to as saturated hydrocarbons?

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3. What type of isomerism is possible in alkanes ? Write all the possible isomers of butane.

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4. Discuss the structure of ethene.

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5. What are the conditions necessary for a compound to show geometrical isomerism ?

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6. What is the origin of geometrical isomerism in alkenes ?

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7. Identify the type of isomerism exhibited by the following compounds ?

$CH_3 - CH = CH - CH_2CH_3$

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8. Identify the type of isomerism exhibited by the following compounds ?

$CH_3CH_2CH_2CH_3$

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9. Identify the type of isomerism exhibited by the following compounds ?

C_5H_{12}

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10. Why do alkynes not show geometrical isomerism ?

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11. Discuss with examples the various types of isomerism shown by alkynes.

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12. What is the origin of petroleum in nature ?

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13. How is petroleum mined from an oil well ?

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14. What do you understand by cracking ? What is its significance in petroleum industry?

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15. Define reforming. How is the process useful in improving the quality of gasoline ?

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16. What is synthetic petrol?

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17. What is knocking? How is it related to the structure of hydrocarbons used as fuels ?

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18. Define octane number. A sample of gasoline produces the same knocking as mixture containing 35% n-heptane and 65% iso-octane. What is the octane number of the sample ?

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19. Describe different methods to improve the quality of a fuel used in a gasoline engine.

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20. What is the relationship between the structure of hydrocarbons used as fuels and their octane numbers ?

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21. What is Wurtz reaction ? Explain with examples. What are its limitations?

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22. What are Grignard reagents and how are they prepared ? What happens when a Grignard reagent is treated with water ?

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23. Describe Kolbe's electrolytic method for the preparation of methane.

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24. Explain why A branched chain alkane possesses lower boiling point than the corresponding straight chain alkane.

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25. Explain why Alkanes with odd number of carbon atoms possess lower boiling points than those having even number of carbon atoms

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26. Explain why Alkanes do not possess much chemical reactivity under ordinary conditions?

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27. What do you understand by substitution reactions? Explain taking the example of ethane.

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28. How will you convert methane to ethane

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29. How will you convert ethane to butane

Watch Video Solution

30. How will you convert ethane to methane?

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31. Describe the mechanism of dehydration of an alcohol in the presence of H_2SO_4

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32. What happens when 2-bromopropane is treated with alcoholic KOH

Watch Video Solution

33. What happens when 1,2-dibromopropane is heated with zinc dust

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34. What happens when HBr is added to propene

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35. What happens when 2-methyl propene is heated with a concentrated solution of $KMnO_4$

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36. What happens when propene is treated with chlorine at 773 K?

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37. Explain why Alkenes have higher melting points than the alkanes with the same carbon skeleton.

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38. ____hydrocarbons undergo addition reactions.

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39. Explain why The colour of Baeyer's reagent gets discharged when treated with an alkene.

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40. Explain why Teflon is used in making non-stick cooking utensils.

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41. What is Markownikoff's rule and how is it useful in predicting the addition of an unsymmetrical reagent to an unsymmetrical alkene? What is peroxide effect?

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42. Explain the ozonolysis of 2-butene.

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43. A hydrocarbon decolourised bromine water. On ozonolysis it gives 3-methyl butanal and acetaldehyde. Write the structure of the hydrocarbon.

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44. An alkene gives propan-2-one and 2-methylpropanal on ozonolysis. Identify the alkene. What products will be obtained when it is treated with hot and concentrated $KMnO_4$?

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45. How will you distinguish pentane from 1-pentene ?

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46. How will you convert ethane to ethene

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47. How will you convert propene to propane

Watch Video Solution

48. How would you convert ethanol to ethene?

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49. How will you convert propene to 2-bromopropane

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50. How will you convert propene to 2, 3-dimethylbutane?

Watch Video Solution

51. What happens when acetylene is treated with ozone

Watch Video Solution

52. What happens when 1, 2-dibromo butane is treated with sodamide,

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53. What happens when an aqueous solution of potassium maleate is subjected to electrolysis

Watch Video Solution

54. What happens when iodoform is heated with silver powder

Watch Video Solution

55. What happens when but-2-yne is treated with dilute $KMnO_4$ solution at room temperature ?

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56. Describe a method to distinguish ethane, ethene and ethyne.

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57. How will you bring out the following conversions ?

Ethyne to methane

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58. How will you bring out the following conversions ?

Ethene to ethyne

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59. How will you bring out the following conversions ?

Ethane to ethyne

Watch Video Solution

60. How will you bring out the following conversions ?

Ethyne to but-2-yne

Watch Video Solution

61. How will you bring out the following conversions ?

Ethyne to ethane

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62. How will you account for the acidic character of acetylene?

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63. Why are alkenes more reactive than alkanes ?

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64. What are poly atomic ions? Give two examples?

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65. Mention the important characteristics of aromatic compounds.

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66. What are arenes? Give two examples.

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67. Discuss the Kekule's structure of benzene.

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68. Explain the resonance structure of benzene. What do you understand by resonance hybrid?

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69. What is meant by aromaticity ?

Watch Video Solution

70. What is Huckel's rule ?

Watch Video Solution

71. Write the structures of possible isomers of dichlorobenzene.

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72. What is meant by directive influence of groups ? Sort out the o- and p-, and m-directing groups among the following ?

$-OH\ -CN,\ -COOH,\ -CH_3,\ -Br,\ -OCH_3,\ -SO_3H$

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73. Why does a m-directing group direct the incoming group towards the m-position ?

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74. How does an o- and p-directing group activate the ring? Illustrate with an example.

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75. What are the main constituents of coal tar?

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76. How is benzene prepared in the laboratory? Write a note on its electrophilic substitution reactions.

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77. How is benzene manufactured from coal tar ? Describe the process.

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78. Although benzene is highly unsaturated it does not undergo addition reactions. The explanation of this can be suggested as

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79. What are the most characteristic reactions of benzene ? Give two examples.

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80. Discuss the mechanism of nitration of benzene.

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81. What is Friedel-Crafts reaction? Give an example.

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Essay Long Answer Type Questions

1. What are hydrocarbons and how are they classified?

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2. Why are alkenes and alkynes regarded as unsaturated hydrocarbons? Discuss the structures of ethene and ethyne.

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3. What is geometrical isomerism and what type of compounds do exhibit it?

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4. An oxygen containing organic compound was found to contain 53% carbon and 13% hydrogen. Its vapour density is 23. The compound reacts with sodium metal to liberate hydrogen. Identify the functional isomer of this compound.

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5. What do you understand by cracking and reforming?

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6. Describe the principle involved in the synthesis of petrol from coal by Bergius process. Describe the process with a flow diagram

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7. Describe the principle involved in the synthesis of petrol from coal by Bergius process. Describe the process with a flow diagram

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8. Describe some important methods for the preparation of alkanes. Discuss the substitution reactions of alkanes.

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9. Describe the important methods for the preparation of alkenes.

Watch Video Solution

10. Why do alkenes and alkynes undergo addition reactions ? Describe some important addition reactions of alkenes and alkynes.

Watch Video Solution

11. Describe the important methods for the preparation of alkynes.

Watch Video Solution

12. What is ozonolysis and how is it useful in locating the position of double bond in an alkene? How would you detect the presence of double bond in an unknown compound?

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13. Describe the oxidation reactions of alkenes and alkynes.

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14. What is polymerisation? Describe some important polymerisation reactions of ethyne.

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15. Write short notes on the Catalytic oxidation of hydrocarbons

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16. Write short notes on the Markownikoff's rule

Watch Video Solution

17. Write short notes on the Friedel-Crafts reaction

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18. Write short notes on the Wurtz reaction

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19. Write short notes on the Grignard reagents

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20. Why do alkenes undergo electrophilic addition reactions ? Discuss the mechanism of electrophilic addition reactions of alkenes.

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21. Discuss the orbital structure of benzene.

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22. What do you understand by the term aromaticity ?

Watch Video Solution

23. What do you understand by the directive influence of a group?

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24. What products are obtained on the destructive distillation of coal ? How are aromatic compounds isolated from coal tar? Describe in detail.

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25. How is benzene prepared in the laboratory and on commercial scale ?

How does it react with ozone

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26. How is benzene prepared in the laboratory and on commercial scale ?

How does it react with conc. HNO_3 in the presence of conc. H_2SO_4

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27. How is benzene prepared in the laboratory and on commercial scale ?

How does it react with C_2H_5Cl in the presence of $AlCl_3$?

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28. Give a detailed account of the electrophilic substitution reactions of benzene. Discuss the mechanism also.

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Objective Multiple Choice Type Questions

1. Which of the following formulae represent an alkane?

A. $C_{10}H_{20}$

B. C_7H_{16}

C. C_5H_8

D. C_9H_{10}

Answer: B

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2. How many structural isomer(s) is/are possible for $C_2H_4Br_2$?

A. A. 1

B. B. 2

C. C. 3

D. D. 4

Answer: B

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3. The total number of isomers for the compounds of the formula $C_4H_{10}O$ are

A. 7

B. 6

C. 3

D. 4

Answer: A

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4. Which one of the following compounds will show geometrical isomerism ?

A. A. 2-Butene

B. B. Propene

C. C. 1-Phenylpropene

D. D. 2-Methyl-2-butene

Answer: A

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5. Which of the following compounds will exhibit cis-trans (geometrical) isomerism?

A. But-2-ene

B. But-2-yne

C. Butan-2-ol

D. But-1-ene

Answer: A

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6. Bond angle in alkenes is equal to

A. 120°

B. $109^\circ 28'$

C. 180°

D. 60°

Answer: A

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7. When potassium acetate is electrolysed, we get

A. methane

B. ethane

C. acetylene

D. ethylene

Answer: B

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8. To prepare a pure sample of n-hexane, using sodium metal as one of the reactant, the other reactant(s) will be

A. ethyl chloride and n-butyl chloride

B. methyl bromide and n-pentyl bromide

C. n-propyl bromide

D. ethyl bromide and n-butyl bromide.

Answer: C

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9. CH_4 is formed when

A. sodium acetate is heated with soda lime

B. iodomethane is reduced

C. aluminium carbide reacts with water

D. all of the above.

Answer: D

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10. Which of the following products is obtained when methyl magnesium bromide reacts with ethyl alcohol ?

A. Acetone

B. Alcohol

C. Methane

D. Ethane

Answer: C

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11. Wurtz reaction using bromoethane yields

A. (i) 2-bromobutane

B. (ii) n-butane

C. (iii) iso-butane

D. (iv) ethane.

Answer: B

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12. The compound with the highest boiling point is

A. n-hexane

B. n-pentane

C. 2,2-dimethylpropane

D. 2-methylbutane.

Answer: A

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13. Liquid hydrocarbon is converted to a mixture of gaseous hydrocarbons by

A. cracking

B. hydrolysis

C. oxidation

D. distillation under reduced pressure.

Answer: A

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14. Bromoethane on treatment with alcoholic KOH gives

A. ethyl alcohol

B. butane

C. methane

D. ethylene

Answer: D

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15. Dehydrohalogenation involves removal of the halogenn atom together with a hydrogen atom from carbon adjacent to the one with halogen atom. Alcoholic KOH is used for dehydrohalogenation. According to saytzeff's rule, when two alkenes may be formed, the alkene which is most substituted is the major product.

Q. The ease of dehydrohalogenation for different halogens is in the order

A. dehydrogenation

B. dehalogenation

C. dehydration

D. dehydrohalogenation

Answer: D

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16. The compound that decolourises alk. $KMnO_4$ is

A. C_3H_8

B. C_2H_4

C. CH_4

D. CCl_4

Answer: B

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17. The product formed when but-1-ene is subjected to HBr in the presence of peroxide is

A. 1-bromobutane

B. 2-bromobutane

C. 1, 1-dibromobutane

D. 1, 2-dibromobutane.

Answer: A

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18. $CH_2 = CHCl$ reacts with HCl to form

A. A)$CH_2Cl - CH_2Cl$

B. $B)CH_3 - CHCl_2$

C. C)$CH_2 = CHCl.\ HCl$

D. D)none of these

Answer: B

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19. The final products formed by ozonolysis of compound $R - CH = CR_2$ is

A. RCHO

B. R_2CO

C. both

D. none of these

Answer: C

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20. What is Baeyer's reagent ?

A. alkaline permanganate solution

B. acidified permanganate solution

C. neutral permanganate solution

D. aqueous bromine solution

Answer: A

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21. Dilute aqueous $KMnO_4$ at room temperature reacts with R-CH=CH-R to give

A. $R - CHO$

B. $R - COOH$

C. $RCHOH - CHOHR$

D. $CO_2 + H_2O$

Answer: C

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22. Acetylene can be prepared from

A. potassium fumerate

B. calcium carbide

C. ethylene bromide

D. all of these.

Answer: D

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23. Number of acidic hydrogen atoms in but-1-yne is

A. 1

B. 2

C. 3

D. 4

Answer: A

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24. Which of the following reacts with metal by displacing the hydrogen atom?

A. CH_4

B. C_2H_6

C. C_2H_4

D. C_2H_2

Answer: D

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25. 

In the above reaction X is

A. HNO_3

B. O_2

C. O_3

D. $KMnO_4$

Answer: C

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26. Which one of the following reagents distinguish ethylene from acetylene?

A. A. Aqueous alkaline $KMnO_4$

B. B. Cl_2 dissolved in CCl_4

C. C. Ammoniacal Cu_2Cl_2

D. D. conc. H_2SO_4

Answer: C

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27. A hydrocarbon that reacts with sodium in liquid NH_3 is

A. $CH_3 - CH_2 - C \equiv C - H$

B. $CH_3 - C \equiv C - CH_3$

C. $CH_3 - CH = CH - CH_3$

D. $CH_3 - CH_2 - CH = CH_2$

Answer: A

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28. A metallic carbide on treatment with water gives a colourless gas which burns readily in air and gives a precipitate with ammoniacal silver nitrate solution. The gas evolved is

A. methane

B. ethane

C. acetylene

D. ethylene

Answer: C

Watch Video Solution

29. In alkenes, π -electrons forming carbon-carbon π-bond are

A. localised

B. delocalised over the entire molecule

C. may or may not be delocalised

D. none of the above

Answer: A

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30. The process $C_7H_{16} \xrightarrow[670K]{Pt} C_6H_5CH_3 + 4H_2$ is a

A. cracking process

B. reforming process

C. platforming process

D. substitution process.

Answer: B::C

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31. Which of the following when used as a fuel have the maximum tendency to resist knocking ?

A. Straight chain alkanes

B. Cycloalkanes

C. Olefins

D. Branched chain alkanes

Answer: D

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32. The quality of diesel is expressed in terms of

A. octane number

B. decane number

C. ignition number

D. cetane number

Answer: D

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33. Which of the following when treated with a Grignard reagent yield (s) an alkane?

A. H_2O

B. C_2H_5OH

C. both H_2O and CH_3CH_2OH

D. none of the two

Answer: C

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34. A compound decolourises Baeyer's reagent and gives a mixture of propanoic acid and ethanoic acid when treated with a hot and conc. solution of $KMnO_4$. The compound is

A. pent-1-ene

B. pent-2-ene

C. 2-methylbut-1-ene

D. 2-methylbut-2-ene

Answer: B

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35. Nitration of benzene by nitric acid and sulphuric acid is

A. electrophilic substitution

B. electrophilic addition

C. nucleophilic substitution

D. free radical substitution.

Answer: A

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36. Benzene vapour mixed with air when passed over V_2O_5 catalyst at 775 K give

A. glyoxal

B. oxalic acid

C. maleic anhydride

D. fumaric acid.

Answer: C

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37. Which of the following statements is correct for benzene ?

A. All the six carbon atoms and all the six hydrogen atoms lie in different planes.

B. The ring system consists of three localised $C-C\pi$ -bonds.

C. The ring system consists of a delocalised π-molecular orbital containing six electrons.

D. Each C atom is in a state of sp^3 hybridisation.

Answer: C

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38. In the Friedel-Crafts acylation, the attacking species is

A. $AlCl_3$

B. CH_3COCl

C. Cl^+

D. CH_3CO^+

Answer: D

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39. Which of the following is not the characteristics of an arene?

A. A. Resonance

B. B. Delocalization of pie electrons

C. C. More stability

D. D. Undergoes electrophilic addition reaction

Answer: B

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40. In the reaction HIO_3 acts as

A. A. a catalyst

B. B. a halogen carrier

C. C. an oxidizing agent

D. D. a reducing agent.

Answer: C

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41. Propyne and propene can be distinguished by

conc. H_2SO_4

Br_2 in CCl_4

dil. $KMnO_4$

$AgNO_3$ in ammonia

A. *conc.* H_2SO_4

B. Br_2 in CCl_4

C. dil. $KMnO_4$

D. $AgNO_3$ in ammonia

Answer: D

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42. Acetylene does not react with

A. Na

B. ammoniacal $AgNO_3$

C. HCl

D. NaOH

Answer: D

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43. But-1-ene may be converted to butane by reaction with

A. Zn-HCl

B. Sn-HCl

C. Zn-Hg

D. Pd / H_2

Answer: D

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44. 2-methylbutane on reacting with bromine in the presence of sunlight gives mainly

A. 1-bromo-3-methylbutane

B. 2-bromo-3-methylbutane

C. 2-bromo-2-methylbutane

D. 1-bromo-2-methylbutane

Answer: C

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45. Presence of a nitro group in a benzene ring

A. activates the ring towards electrophilic substitution

B. renders the ring basic

C. deactivates the ring towards nucleophilic substitution

D. deactivates the ring towards electrophilic substitution.

Answer: D

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46. In the following sequence of reactions, the alkene affords the compound 'B'

$CH_3CH - CHCH_3 \xrightarrow{O_3} A \xrightarrow[Zn]{H_2O} B$ the compound B is

A. CH_3CH_2CHO

B. CH_3COCH_3

C. $CH_3CH_2COCH_3$

D. CH_3CHO

Answer: D

Watch Video Solution

47. The hydrocarbon which can react with sodium in liquid ammonia is :

1.$CH_3CH_2CH_2C \equiv \mathrm{CCH}_2CH_2CH_3$

2. $CH_3CH_2C \equiv CH$

3.$CH_3CH = CHCH_3$

4.$CH_3CH_2C \equiv \mathrm{CCH}_2CH_3$

A. $CH_3CH_2CH_2C \equiv \mathrm{CCH}_2CH_2CH_3$

B. $CH_3CH_2C \equiv CH$

C. $CH_3CH = CHCH_3$

D. $CH_3CH_2C \equiv \mathrm{CCH}_2CH_3$

Answer: B

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48. The treatment of CH_3MgX with $CH_3C \equiv C - H$produces

A. a. CH_3 - CH = CH_2`

B. b.$CH_3C \equiv C - CH_3$

C. c.$CH_3 - \overset{H}{\underset{|}{C}} = \overset{H}{\underset{|}{C}} - CH_3$

D. d.CH_4

Answer: B

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49. Ozonolysis of an organic compound gives formaldehyde as one of products. This confirms the presence of

A. two ethylenic double bonds

B. a vinyl group

C. an iso propyl group

D. an acetylenic triple bond.

Answer: B

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50. Ozonolysis of an organic compound A produces acetone and propionaldehyde in equimolar mixture. Identify A from the following compounds.

A. 2-methyl pent-l-ene

B. pent-1-ene

C. pent-2-ene

D. 2-methyl pent-2-ene

Answer: D

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51. The non-aromatic compound among the following is

A. 

B. 

C. 

D. 

Answer: A

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52. In the following the most stable conformation of n-butane is

A. 

B. 

C. 

D. 

Answer: B

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53. With respect to the conformers of ethane, which of the following statements is true ?

A. Bond angle remains same but bond length changes.

B. Bond angle changes but bond length remains same.

C. Both bond angle and bond length change.

D. Both bond angles and bond length remains same.

Answer: D

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54. Predict the correct intermediate and product in the following reaction

$$H_3C - C \equiv CH \xrightarrow[HgSO_4]{H_2O, H_2SO_4} \underset{(A)}{\text{intermediate}} \rightarrow \underset{(B)}{\text{product}}$$

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55. Which one is the correct order of acidity?

A.

$$CH_2 = CH_2 > CH_3 - CH = CH_2 > CH_3 - C \equiv CH > CH \equiv C$$

B. $CH \equiv CH > CH_3 - C = CH > CH_2 = CH_2 > CH_3 - CH_3$

C. $CH \equiv CH > CH_2 > CH_2 > CH_3 - C \equiv CH > CH_3 - CH_3$

D. $CH_3 - CH_3 > CH_2 = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

Answer: B

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56. 3-methyl-pent-2-ene on reaction with HBr in the presence of peroxide forms an addition product. The number of possible stereoisomers for the product is

A. two

B. four

C. six

D. zero

Answer: B

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57. Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is:

1.$CH \equiv CH$

2.$CH_2 = CH_2$

3.$CH_3 - CH_3$

4.CH_4

A. $CH \equiv CH$

B. $CH_2 = CH_2$

C. $CH_3 - CH_3$

D. CH_4

Answer: D

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58. The compound C_7H_8 undergoes the following reactions :

$$C_7H_8 \xrightarrow{3Cl_2\,/\,\Delta} A \xrightarrow{Br_2\,/\,Fe} B \xrightarrow{Zn\,/\,HCl} C$$

The product C is :

1) m- bromotoluene

2) o-bromotoluene

3)3-bromo-2, 4, 6-trichlorotoluene

4) p-bromotoluene

A. m-bromotoluene

B. o-bromotoluene

C. 3-bromo-2, 4, 6-trichlorotoluene

D. p-bromotoluene

Answer: A

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59. Identify the major products P, Q and R in the following sequence of reactions :

A. 

B. 

C. 

D. 

Answer: D

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60. Which of the following represents the given sequence of hybridisation of carbon atoms from left to right sp^2, sp^2, sp, sp?

A. $CH \equiv C - C \equiv CH$

B. $CH_2 = CH - C \equiv CH$

C. $CH_2 = CH - CH = CH_2$

D. $CH_3 - CH = CH - CH_3$

Answer: B

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61. The trans-alkenes are formed by the reduction of alkynes with

A. $H_2 - Pd/C, BaSO_4$

B. $NaBH_4$

C. Na/liq. NH_3

D. $Sn - HCl$

Answer: C

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62. Among the following, the reaction that proceeds through an electrophilic substitution, is :

A. 

B. 

C. 

D. 

Answer: D

Watch Video Solution

63. The most suitable reagent for the following conversion, is

A. Zn/HCl

B. $Hg^{2+}/H^{+}, H_2O$

C. Na/liq. NH_3

D. H_2, Pd/C , quinoline

Answer: D

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64. An alkene "A" on reaction with O_3 and Zn gives propanone and acetaldehyde in equimolar Addition of HCl to alkene "A" gives "B" as the product. The structure of product "B" is:

A. 

B. 

C. 

D. 

Answer: A

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65. In the following skew conformation of ethane, H'-C-C-H" dihedral angle is :

a.120°

b.58°

c.151°

d.149°

A. 120°

B. 58°

C. 151°

D. 149°

Answer: D

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66. 25 g of an unknown hydrocarbon upon burning produces 88 g of CO_2 and 9 g of H_2O . This unknown hydrocarbon contains

A. 18 g of carbon and 7 g of hydrogen

B. 20 g of carbon and 5 g of hydrogen

C. 22 g of carbon and 3 g of hydrogen

D. 24 g of carbon and 1 g of hydrogen.

Answer: D

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67. The major product of the following reaction is

A. 

B. 

C. 

D. 

Answer: C

Watch Video Solution

68. The major product of the following reaction is :

$$CH_3CH = CHCO_2CH_3 \xrightarrow{LiAlH_4}$$

A. $CH_3CH_2CH_2CO_2CH_3$

B. $CH_3CH_2CH_2CH_2OH$

C. $CH_3CH = CHCH_2OH$

D. $CH_3CH_2CH_2CHO$

Answer: C

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69. Which one of the following alkenes when treated with HCI yields majorly an anti-Markownikoff product:

1.CH_3O - CH = CH_22. H_2N - CH = CH_23. F_3C - CH =CH_24. Cl - CH = CH_2`

A. $CH_3O - CH = CH_2$

B. $H_2N - CH = CH_2$

C. $F_3C - CH = CH_2$

D. $Cl - CH = CH_2$

Answer: C

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70. The percentage composition of carbon by mole in methane is:

A. 0.75

B. 0.8

C. 0.2

D. 25%.

Answer: C

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71. Poly substitution is a major drawback in

(a)Reimer Tiemann reaction

(b)Friedel Crafts acylation

(c)Friedel Crafts alkylation

(d)acetylation of aniline.

A. Reimer Tiemann reaction

B. Friedel Crafts acylation

C. Friedel Crafts alkylation

D. acetylation of aniline.

Answer: C

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True Or False Type Questions

1. Comment over the following statement. Hydrocarbons may be both acyclic as well as cyclic

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2. All alkanes possess sp^3 hybridised carbon atoms.

Watch Video Solution

3. Why do alkynes not show geometrical isomerism ?

Watch Video Solution

4. Do structural isomers possess similar chemical properties?

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5. What are the four condition for aromaticity?

Watch Video Solution

6. 1-butene cannot show geometrical isomerism.

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7. Explain the cause of geometrical isomerism and state the properties of geometrical isomers.

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8. Hydrocarbons are the parent compounds of all other organic compounds.

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9. Petroleum ether obtained on fractionation of petroleum contains pentane, hexane and heptane. State whether the statement is true or not.

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10. Find the valency if Chlorine.

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11. A fuel has the same knocking property as a mixture of 70% isooctane (2,2,-4 trimethyl pentane) and 30% n heptane by volume, the octane number of the fuel is

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12. The branching in an alkane increases its tendency of knocking. Comment over the statement and name the commonly used antiknocking agent.

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13. What is leaded gasoline?

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14. Assertion: Wurtz reaction is not preferred for the preparation of alkanes containing odd number of carbon atoms.

Reason: It is not possible to prepare alkanes with odd number of carbon atoms through wurtz reaction.

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15. Removal of CO_2 from a -COOH group is called decarboxylation.

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16. Alkanes containing even number of carbon atoms possess higher melting points than those containing odd number of carbon atoms.

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17. Write the chlorination reactions of ethene

Watch Video Solution

18. Alkanes burn with a smoky flame.

Watch Video Solution

19. $CH_2Br-CH_2-CH_2$ Br is a vicinal dihalide. True/False

Watch Video Solution

20. In the presence of peroxide addition of HBr to propene takes place according to anti Markownikoff's rule but peroxide effect is not seen in the case of HCl and HI. Explain.

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21. Assertion (A). Combustion of all organic compounds is an exothermic reaction.

Reason (R). The enthalpies of all elements in their standard state are zero

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22. Teflon is also known as PTFE.

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23. Melting and boiling points of alkynes are lower than those of the corresponding alkenes.

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24. Acetylene upon ozonolysis gives

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25. Why do alkenes prefer to undergo electrophilec addition reaction while arenes prefer electrophilic substitution reactions ? Explain.

Watch Video Solution

26. What are aromatic compounds ? Give at least two examples.

Watch Video Solution

27. All C-C bonds in benzene are of equal length.

Watch Video Solution

28. Benzene ring contains ____ localised σ - and ____localised π -bonds.

Watch Video Solution

29. Explain resonance in benzene.

Watch Video Solution

30. Naphthalene is an aromatic compound.

Watch Video Solution

31. How does an o- and p-directing group activate the ring? Illustrate with an example.

Watch Video Solution

32. Given an example of meta-directing group.

Watch Video Solution

33. The creosote oil fraction of coal tar distillation contains mainly cresols and naphthalene.

Watch Video Solution

34. Benzene burns with a luminous flame.

Watch Video Solution

35. The attacking species in the sulphonation of benzene is SO_3 .

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Fill In The Blanks Type Questions

1. Alkanes are also referred to as..... and have the general formula ..... .

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2. Methane molecule is ..... in shape with all bond angles equal to .....

Watch Video Solution

3. Convert :

Carbon to acetylene

Watch Video Solution

4. Reforming is the process of converting ..... and ..... alkanes into corresponding ..... hydrocarbons.

Watch Video Solution

5. The knocking behaviour of a fuel with octane number 60 is the same as the mixture containing .....% iso-octane and .....% n-heptane.

Watch Video Solution

6. The commonly used antiknock compound is .....

Watch Video Solution

7. Compounds of the type R-Mg-X are known as.....

Watch Video Solution

8. Sodalime is a mixture of ..... and ..... in the ratio.....

Watch Video Solution

9. Fluorination of alkenes takes place ..... and may result in the rupture of ..... bond.

Watch Video Solution

10. The coversion of n-hexane to benzene involves .....

Watch Video Solution

11. ..... is a better dehydrohalogenating agent as compared to .....

Watch Video Solution

12. Alkenes and alkynes burn with a ..... . flame.

Watch Video Solution

13. The best method for locating the position of double bond in an unknown alkene is .....

Watch Video Solution

14. The molecular weight of low density polythene ranges between .....and.....

Watch Video Solution

15. The dehydrohalogenation of a 1, 1-dihalide results in the formation of an .....

Watch Video Solution

16. When acetylene is treated with ammonical cuprous chloride, a ..... precipitate of ..... is formed.

Watch Video Solution

17. The delocalised π -molecular orbital in benzene contains three ..... bicentric molecular orbitals and possesses full ..... symmetry.

View Text Solution

18. A ring system exhibits aromatic character when it contains ..... π-electrons.

Watch Video Solution

19. Furan (C_4H_2O) is an ..... compound.

Watch Video Solution

Watch Video Solution

20. o- and p-directing substituents are ..... substituents, whereas m-directing substituents are ..... substituents.

Watch Video Solution

21. The first stage in the formation of coal in nature is ..... which contain ..... % of carbon.

Watch Video Solution

22. The light oil fraction of coal tar mainly contains....., ..., and .....

Watch Video Solution

Assertion Reason Type Questions

1. Assertion : The carbon-carbon bond length in benzene lies between the bond lengths of C-C and C=C bonds found in other molecules.

Reason: Benzene exhibits the phenomenon of resonance

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. I Assertion is CORRECT but Reason is INCORRECT.

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: A

Watch Video Solution

2. Alkanes containing even number of carbon atoms possess higher melting points than those containing odd number of carbon atoms.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. I Assertion is CORRECT but Reason is INCORRECT.

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: D

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3. Assertion: The major product obtained in the reaction of HBr with propene is 2-bromopropane.

Reason : 2° carbocations are more stable than 1° carbocations.

a. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

b.f both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

c.Assertion is CORRECT but Reason is INCORRECT.

d.If Assertion is INCORRECT but Reason is CORRECT.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. I Assertion is CORRECT but Reason is INCORRECT.

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: A

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4. Assertion : Alkynes are less reactive than alkenes towards electrophilic reagents

Reason : General formula of alkenes is CnH2n-2

a.If both Assertion and Reason are CORRECT and Reason is the CORRECT

explanation of the Assertion.

b.If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

c. Assertion is CORRECT but Reason is INCORRECT.

d.If Assertion is INCORRECT but Reason is CORRECT.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. I Assertion is CORRECT but Reason is INCORRECT.

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: B

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5. Assertion : Addition of bromine to trans-but-2-ene yields meso-2,3-dibromobutane.

Reason : Bromine addition to an alkene is a nucleophilic addition

(a) If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

(b) If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

(c) I Assertion is CORRECT but Reason is INCORRECT.

(d)I Assertion is CORRECT but Reason is INCORRECT.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. I Assertion is CORRECT but Reason is INCORRECT.

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: C

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Ncert Text Book Exercises

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

Watch Video Solution

2. Write the IUPAC names of the compound:

$CH_3CH = C(CH_3)_2$

Watch Video Solution

3. Write the IUPAC names of the compound:

$CH_2 = CH - CH \equiv C - CH_3$

Watch Video Solution

4. Write the IUPAC names of the compound

Watch Video Solution

5. Write the IUPAC names of the compound:

Watch Video Solution

6. Write the IUPAC names of the compound:

Watch Video Solution

7. Write the IUPAC names of the compound:

Watch Video Solution

8. Write the IUPAC names of the compound:

$$CH_3 - CH = CH - CH_2 - CH = CH - \underset{\underset{C_2H_5}{|}}{C}H - CH_2 - CH = CH_2$$

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9. For the following compounds, write structural formulas and IUPAC names for all possible isomers having the number of double or triple bond as indicated:

(a) C_4H_8(one double bond)

(b) C_5H_8 (one triple bond)

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10. For the following compounds, write structural formulas and IUPAC names for all possible isomers having the number of double or triple bond as indicated:

(a) C_4H_8(one double bond)

(b) C_5H_8 (one triple bond)

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11. Write IUPAC names of the products obtained by the ozonolysis of the following compounds:

(i) Pent-2-ene (ii) 3,4-Dimethyl-hept-3-ene

(iii) 2-Ethylbut-1-ene (iv) 1-Phenylbut-1-ene

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12. Write IUPAC names of the products obtained by the ozonolysis of the following compounds:

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(i) Pent-2-ene (ii) 3,4-Dimethyl-hept-3-ene

(iii) 2-Ethylbut-1-ene (iv) 1-Phenylbut-1-ene

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

Watch Video Solution

16. An alkene 'A' contains three C – C, eight C – H (σ) bonds and one C – C (π) bond. 'A' on ozonolysis gives two moles of an aldehyde of molar mass 44 u. Write IUPAC name of 'A'.

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

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18. Write chemical equations for combustion reaction of the following hydrocarbons:

(i) Butane

(ii) Pentene

(iii) Hexyne

(iv) Toluene

Watch Video Solution

Watch Video Solution

19. Write chemical equations for combustion reaction of the following hydrocarbons:

(i) Butane

(ii) Pentene

(iii) Hexyne

(iv) Toluene

Watch Video Solution

20. Write chemical equations for combustion reaction of the following hydrocarbons:

(i) Butane

(ii) Pentene

(iii) Hexyne

(iv) Toluene

Watch Video Solution

21. Write chemical equations for combustion reaction of the following hydrocarbons:

(i) Butane

(ii) Pentene

(iii) Hexyne

(iv) Toluene

Watch Video Solution

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

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

Watch Video Solution

24. What are the necessary conditions for any system to be aromatic?

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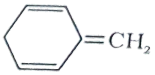
25. Explain why the following systems are not aromatic?

(i) 

(ii) 

(iii) 

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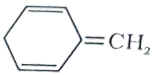
26. Explain why the following systems are not aromatic?

(i) 

(ii) 

(iii) 

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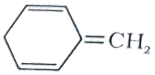
27. Explain why the following systems are not aromatic?

(i) 

(ii) 

(iii) 

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28. How will you convert benzene into

(i) p-nitrobromobenzene

(ii) m-nitrochlorobenzene

(iii) p -nitrotoluene

(iv) acetophenone

Watch Video Solution

29. How will you convert benzene into (a) p-nitrobromobenzene (b) m-nitrobromobenzene

Watch Video Solution

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(i) p-nitrobromobenzene

(ii) m-nitrochlorobenzene

(iii) p -nitrotoluene

(iv) acetophenone

Watch Video Solution

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(i) p-nitrobromobenzene

(ii) m-nitrochlorobenzene

(iii) p -nitrotoluene

(iv) acetophenone

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32. In the alkane $H_3C - CH_2 - C(CH_3)_2 - CH_2 - CH(CH_3)_2$, identify $1^\circ, 2^\circ, 3^\circ$, carbon atoms and give the number of H atoms

bonded to each one of these.

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

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34. Addition of HBr to propene yields 2-bromopropane, while in the presence of benzoyl peroxide, the same reaction yields 1-bromopropane. Explain and give mechanism.

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

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

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

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38. How would you convert the Ethyne compounds into benzene?

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39. How would you convert the following compounds into benzene?

(i) Ethyne

(ii) Ethene

(iii) Hexane

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40. How would you convert the following compounds into benzene?

(i) Ethyne

(ii) Ethene

(iii) Hexane

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

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42. 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, $p - H_3C - C_6H_4 - NO_2, p - O_2N - C_6H_4 - NO_2$.

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43. 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, $p - H_3C - C_6H_4 - NO_2, p - O_2N - C_6H_4 - NO_2$.

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44. Out of benzene, m–dinitrobenzene and toluene which will undergo nitration most easily and why?

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45. Suggest the name of a Lewis acid other than anhydrous aluminium chloride which can be used during ethylation of benzene.

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

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