PREVIOUS HSE QUESTIONS FROM THE CHAPTER "HYDROCARBONS"

1. Draw the 'sawhorse' projections of the eclipsed and staggered conformations of ethane. (2)
2. Give the chemical equation for the conversion of hexane to benzene. Write the name of the process. (2)
3. Predict the Products :

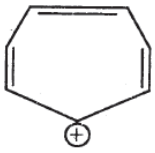
a) $CH_3 - CH = CH_2 + HB_r \xrightarrow{(C_6H_5CO)_2O_2} ?$

b) $3CH \equiv CH \xrightarrow[873K]{\text{Red hot Iron tube}} ?$

c)  $+6Cl_2 \xrightarrow[dark,\ cold]{Anhy.AlCl_3} ?$

(3) [August 2018]

4. What is Wurtz reaction? Give an example. (2)
5. Cycloheptatrienyl cation is given below :



Is this ion aromatic or not? Justify the answer. (2)

6. Identify X, Y and Z in the following sequence of reactions :

$$CH_3 - CH_2 - CH_2Br \xrightarrow{\text{Alcoholic } KOH} X \xrightarrow{O_3} Y \xrightarrow{Zn/H_2O} Z + HCHO$$

(3) [March 2018]

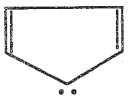
7. a) 

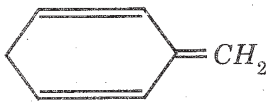
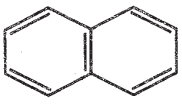
Cyclopentadienyl anion is aromatic. Why? (1)

b) explain the following reactions: i) Substitution ii) Addition (2)

c) Ethyne is acidic in nature. Explain. (2) [July 2017]

8. Benzene and benzeniod compounds show aromatic character.
   a) Select the aromatic compounds from the following:

i)  ii) 

iii)  iv) 

   b) Suggest a method to convert ethyne to benzene. (2)
   c) Give the products formed when benzene reacts with the following:
      i) $CH_3Cl/AlCl_3$ ii) Cl_2/hv [March 2017]

9. a) i) Complete the following reactions:

1) $CH_3CH_2COOK \xrightarrow{electrolysis} .....$

2)  $+CH_3Cl \xrightarrow{AlCl_3} .....$

ii) Write the names of the above reactions? (2)

b) Baeyer's reagent is used to find whether the compound is unsaturated or not. What is Baeyer's reagent? (1)

c) What is the product formed when ethylene is treated with Baeyer's reagent? (2) [September 2016]

10. a) 1-Alkynes are weakly acidic in nature. Give any two reactions to show the acidic character of ethyne. (2)

b) From the following, select the one in which Markownikoff's rule is best applicable.

i) $C_2H_4 + HCl$ ii) $C_3H_6 + Br_2$ iii) $C_3H_6 + HBr$ iv) $C_3H_8 + Cl_2$ (1)

c) Hydrocarbons exhibit isomerism.

i) Name the type of isomerism exhibited by 2-Butene.

ii) Draw the structure of the isomers of 2-butene and select the one which is more polar. (2) [March 2016]

11. Controlled oxidation of alkanes in the presence of suitabie catalysts give a variety of products.

a) Complete the following reaction :

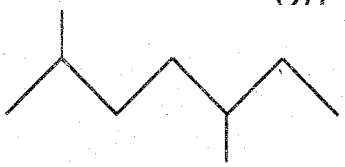
$CH_4 + O_2 \xrightarrow{Mo_2O_3/heat}$ ..... $+ H_2O$ (1)

b) Free rotation about a carbon-carbon single bond is permitted in an alkane molecule.

What are conformers? Draw the structure of the eclipsed and staggered conformers of ethane in Sawhorse and Newman projections and explain their relative stability. (4) [October 2015]

12. Write the IUPAC names of the following compounds:

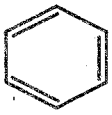
a) $CH_2=CH-CH_2-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$

b) 

13. a) Complete the following chemical equations:

i) $CH_3CH_2Br + 2Na + BrCH_2CH_3 \xrightarrow{dry\ ether} .....$ (1)

ii) $CH_3CH_2I \xrightarrow[\Delta]{alc.\ KOH} .....$ (1)

iii)  $+CH_3Cl \xrightarrow{anhydrous\ AlCl_3} ..... + HCl$ (1)

b) Explain the geometrical isomerism taking 2-Butene as an example. (2)

14. a) Draw the cis and trans isomers of the following compound:

$C_2H_5\text{-}C(CH_3) = C(CH_3)\text{-}C_2H_5$. (2)

b) Complete the following reactions. (1)

i. $3CH \equiv CH \xrightarrow{Red\ hot\ iron\ tube\ at\ 873\ K}$ .....

ii. $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + \ldots\ldots\ldots$

c) Draw the sawhorse projections for eclipsed and staggered forms of an ethane molecule. (2)

15. a) How is alkane prepared by Kolbe's electrolytic method? (2)

b) Select the activating groups from the following: (1)

i) $-NH_2$ ii) $-SO_3H$ iii) $-CH_3$ iv) $-COOH$

c) What is ozonolysis? Write the names of the products obtained when propene undergoes ozonolysis? (2)

[August 2014]

16. a) Write the products of the following chemical reactions and also name them.

i) $2CH_3 - Br + 2Na \xrightarrow{\text{dry ether}} \ldots\ldots\ldots\ldots$

ii) $CH_3 - CH_2Br \xrightarrow{\text{alcoholic KOH}} \ldots\ldots\ldots\ldots$

iii) $CH_3 - COONa \xrightarrow{NaOH/CaO} \ldots\ldots\ldots\ldots$ (3)

b) An alkene 'A' on ozonolysis gave two molecules of formaldehyde. Write the name of 'A' and the chemical equation of ozonolysis. (2) [March 2014]

17. a)  $+ 3Cl_2 \xrightarrow{\text{uv /500K}}$ A

Name the product A. (1)

b) Draw the Newman's projections for the eclipsed and staggered conformations of n-butane. (2)

c) What is Baeyer's reagent? Write the chemical equation of its reaction with ethylene ($CH_2=CH_2$). (2) [Sept. 2013]

18. Many chemical properties of organic compounds can be explained on the basis of electron displacement effects.

a) What is resonance effect? (1)

b) Categorise the following groups into those having +R effect and –R effect:

$-NH_2$, $-NO_2$, -COOH, -OH (1)

19. Free rotation is possible with respect to a C – C bond in the case of alkanes.

a) The repulsive interaction between the adjacent bonds in a conformation is called ……. (1)

b) Draw Newman's projections of the two conformers of ethane. Which among these is more stable? Justify. (2)

c) An alkene on ozonolysis followed by reduction of the ozonide formed with zinc and water gave a mixture of ethanal and methanal.

i) Identify the alkene. (1)

ii) Illustrate the above mentioned reaction using the chemical equation. (1) [March 2013]

20. a) Name the following reactions:

i) C_6H_{14} (n-hexane) $\xrightarrow{\text{Anhydrous } AlCl_3/HCl}$ $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - CH_2 - CH_3$ (2-Methyl pentane)

ii) $C_6H_{14} \xrightarrow[10 - 20 \text{ atm}]{V_2O_5/773K}$  Benzene

iii) $C_6H_{14} \xrightarrow{773K} C_4H_8 + C_2H_6$ (butene + ethane) (3 x 1 = 3)

b) Naphthalene is an aromatic compound. Explain its aromaticity using Huckel's rule. (2) [September 2012]

21. Hydrocarbons are organic compounds containing carbon and hydrogen only.

a) Complete the following chemical reactions:

i) $2CH_3Br + 2\ Na \xrightarrow{\text{dry ether}} \ldots\ldots\ldots\ldots + 2\ NaBr$

ii) $\ldots\ldots\ldots\ldots + Zn \xrightarrow{\text{heat}} C_6H_6 + ZnO$

iii)  $+ 3Cl_2 \xrightarrow{\text{UV, 500K}} \ldots\ldots\ldots\ldots\ldots\ldots$ (3 x 1 = 3)

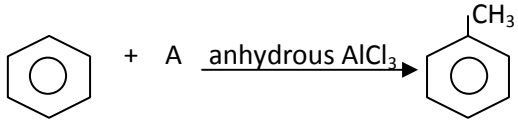
b) Analyze the following reaction:

$CH_3 - CH = CH_2 + H - Br \longrightarrow$ 'A' + 'B'

If 'A' is the major product and 'B' is the minor product, identify 'A' and 'B'. also name the related rule. (2)

[March 2012]

22. The higher homologue of benzene can be prepared by the following reaction.



a) Identify the reagent A. (1)

b) Which namrd reaction is this? (1)

c) Write the reaction mechanism of this reaction. (3) [October 2011]

23. a) Complete the following reactions:

i) $CH_3 - Br + Na \xrightarrow{\text{dry ether}}$?

ii) $CaC_2 + H_2O \longrightarrow$?

iii) $3CH \equiv CH \xrightarrow[873\ K]{\text{Red hot iron tube}}$? (3 x 1 = 3)

b) Illustrate Markovnikov's rule taking the example of propene. (2) [March 2011]

24. In a special condition, addition of HBr to unsymmetrical alkene takes place contrary to Markovnikov's rule.

a) What is the special condition? (1)

b) Give the mechanism of anti Markovnikov's addition of HBr to propene. (4) [September 2010]

25. a) The spacial arrangements of atoms which can be converted into one another by rotation around a C – C single bond are called conformations.

i) Represent Sawhorse and Newman projection formulae of staggered and eclipsed conformations of ethane. (2)

ii) Compare the stabilities of staggered and eclipsed conformations. (1)

c) Consider the reaction given below:

$CH_3 - CH = CH_2 + HBr \longrightarrow CH_3 - CHBr - CH_3 + CH_3 - CH_2 - CH_2Br$

i) Identify the major product obtained. (1)

ii) Name the rule governing the formation of the major product. (1) [March 2010]

26. a) How will you prepare ethane by Kolbe's electrolytic method? (2)

b) Expalin the Markovnikov's rule for the addition reaction using a suitable example. (3) [March 2009]

27. a) Consider the reaction between benzene and nitrating mixture.

 $+ HNO_3 \xrightarrow{\text{Conc. } H_2SO_4}$? (1)

b) What is the reacting species in the above reaction? (1)

c) How is the species formed in the system? (1) [[June 2008]

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