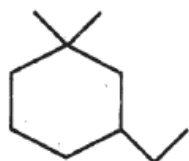
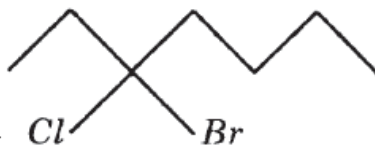


PREVIOUS HSE QUESTIONS FROM THE CHAPTER “ORGANIC CHEMISTRY – SOME BASIC PRINCIPLES AND TECHNIQUES”

1. What is metamerism? Write the metamers of $C_4H_{10}O$. (2)
2. What is 'sodium fusion extract'? How the presence of N, S and halogens in organic compounds are detected? (4)
[August 2018]
3. Give the IUPAC names of the following compounds.



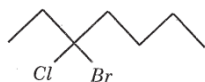
(a)



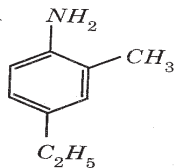
(b)

(2)

4. Briefly describe the principles of the following techniques, taking an example in each case.
 - a) Crystallization
 - b) Simple distillation
 - c) Distillation under reduced pressure
 - d) Paper chromatography (4 x 1 = 4) [March 2018]
5.
 - a) A Method used to purify organic compound is chromatography. Explain adsorption chromatography. (2)
 - b) Compounds having same molecular formula but different structures are called structural isomers. Explain any two structural isomerism. (2)
 - c) Differentiate between nucleophiles and electrophiles. (2) [July 2017]
6.
 - a) Give the structural formula of the following compounds:
 - i) 2,4,7 – Trimethyloctane
 - ii) 2-Chloro-4-methylpentane (2)
 - b) $CH_3CH_2^-$ or $(CH_3)_2CH^-$ which is more stable? Explain. (2)
 - c) Explain the chemistry behind crystallisation. (2) [March 2017]
7.
 - a) Give the IUPAC names of the following:
 - i)



ii)

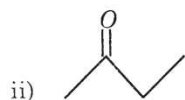


(2)



HSSLiVE.IN

- b) Which is more stable $(CH_3)_3C^+$ or $CH_3CH_2^+$? Give a reason. (2)
 - c) Give the chemistry behind distillation under reduced pressure. (2) [March 2017]
8.
 - a) Bond line notations of some organic compounds are given below. Write the condensed formula and IUPAC names.

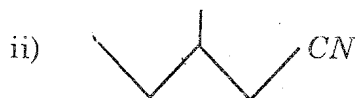
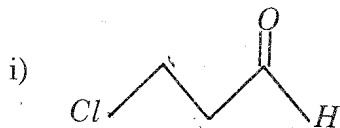


(2)

b) Give the principle of estimation of nitrogen by Dumas method. (2)

c) Explain the concept of resonance with an example. (2) [September 2016]

9. a) Give the IUPAC names of the following:



(2)

b) Phenol exhibit resonance.

i) Draw the resonance structures of phenol. (2)

ii) Predict the directive influence of -OH group in benzene ring. (2)

10. a) Write the structural formula of the following compounds:

i) Pent-4-en-2-ol

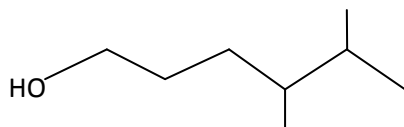
ii) 6-Hydroxyheptanal (2)

b) Reagents which attack organic compounds may be classified as electrophiles, nucleophiles and free radicals.

i) Explain the nucleophiles and electrophiles with suitable examples. (3)

ii) Name the type of the fission of a covalent bond which gives free radicals. (1) [March 2016]

11. The bond-line formula of a compound is given below.



Write its condensed formula and give the IUPAC name. (2)

12. Explain the different types electron displacement effects in covalent bonds.

(Hint: Inductive effect, resonance effect, electromeric effect, hyper conjugation). (4)

13. How is sodium fusion extract prepared? Using this, how will you detect the presence of Nitrogen, Sulphur and Halogen in an organic compound? (4) [October 2015]

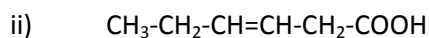
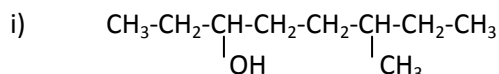
14. What do you mean by the following terms?

a) Homolytic fission b) Heterolytic fission c) Nucleophiles d) electrophiles (4)

15. Various methods for the purification of organic compounds are based on the nature of the compound and the impurity present in it. Explain the principle involved in the following methods of purification:

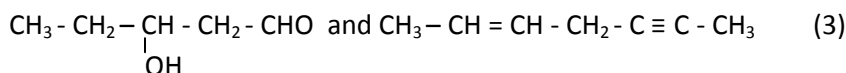
a) Distillation b) Steam distillation (4) [March 2015]

16. Give the IUPAC names of the following compounds: (2)

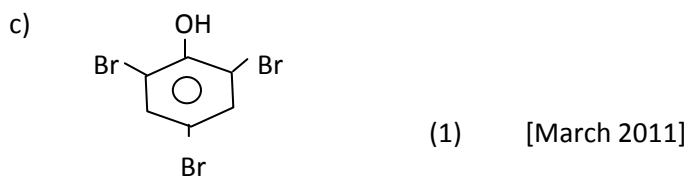
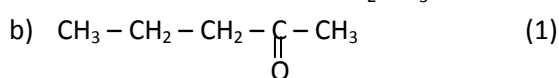
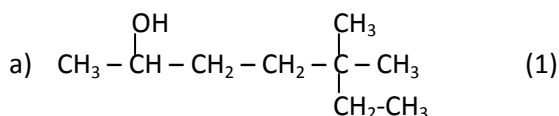





- b) How many 'σ' and 'π' bonds are present in the following compounds?
 $\text{CH}_2 = \text{C} = \text{CH} - \text{CH}_3$ (1)
- c) Write the name of the test used to detect nitrogen, sulphur, halogens and phosphorous present in an organic compound. (1)
- d) Explain any one method for the estimation of nitrogen present in an organic compound. (2) [August 2014]
17. a) Draw the structures of the following compounds.
 i) 2,3-Dibromo-1-phenylpentane
 ii) 4-Ethyl-1-fluoro-2-nitrobenzene (3)
- b) Write all the possible chain isomers of the compound with molecular formula C_5H_{12} . (3)
18. a) Write the complete, condensed and bond line structural formulae of 2-bromobutane. (3)
 b) In the Carius method of estimation of halogen, 0.15g of an organic compound gave 0.12g of AgBr. Find the percentage of Br in the compound. (3) [March 2014]
19. i) Different methods are used to purify organic compounds. Name any three methods of purification. (3)
 ii) On complete combustion, 0.246g of an organic compound gave 0.198g of CO_2 and 0.1014g of H_2O . Determine the percentage composition of carbon and hydrogen in the compound. (3)
20. i) What is homologous series? (1)
 ii) Hyper conjugation is a general stabilizing interaction. Write the hyper-conjugative structures of $\text{CH}_3\text{-CH}_2^+$ (ethylation) (2)
 iii) Write the structures of the following organic compounds.
 a) 2,5,6 – Trimethyloctane
 b) Hexane-2,4-dione
 c) 5-oxohexanoic acid (3) [September 2013]
21. The IUPAC names of alkanes are based on their chain structure.
 a) Give the IUPAC name of

$$\begin{array}{ccccccc} \text{CH}_3 & - & \text{CH}_2 & - & \text{CH} & - & \text{CH}_2 & - & \text{CH} & - & \text{CH}_2 & - & \text{CH}_3 \\ & & & & | & & & & | & & & & \\ & & & & \text{CH}_2\text{-CH}_3 & & & & \text{CH}_3 & & & & \end{array}$$
 (1)
- b) Represent 1-Methyl-3-propylcyclohexane using bond line notation. (1)
 c) What is the type of hybridization of C in CH_3^+ ? Also predict its shape. (1)
 d) Name the type of bond fission resulting in the formation of free radicals? (1)
22. Organic compounds have to be purified before analysis.
 a) Which type of liquids can be purified using distillation under reduced pressure? Suggest an example. (1)
 b) Name the two main types of chromatographic techniques based on the principle of differential adsorption. (1)
 c) In the Lassaigne's test for halogens, they are precipitated as (1)
 d) In what form is nitrogen estimated in the Dumas method? (1) [March 2013]
23. Many chemical properties of organic compounds can be explained on the basis of electron displacement effects.
 a) What is resonance effect? (1)
 b) Categorize the following functional groups into those having +R effect and -R effect: (1)
 $-\text{NH}_2$, $-\text{NO}_2$, $-\text{COOH}$, $-\text{OH}$ (1) [March 2013]
24. i) Give the complete, condensed and bond line formula of 2-methyl pentane and chloro cyclohexane. (3)
 ii) Write the IUPAC name of the following compounds:



25. i) Give any three types of structural isomers. Give examples. (3)
 ii) How will you identify the presence of Halogen by using sodium fusion extract? (2)
 iii) Name the method for estimation of Halogen. (1) [September 2012]
26. A group of organic compounds, each containing a characteristic functional group forms a homologous series.
 a) Give an example for a homologous series. (1)
 b) Give the IUPAC name of the following compound: $\text{CH}_3 - \text{CH}_2 - \text{CO} - \text{CH}_2 - \text{CH}_2 - \text{COOH}$
 c) Write the metamers corresponding to the molecular formula $\text{C}_4\text{H}_{10}\text{O}$. (2)
27. Different techniques are used for the purification of organic compounds based on their nature.
 a) Suggest a suitable method for the separation of a mixture of aniline and water. (1)
 b) Give the chemical name of the compound responsible for the blue colour in the Lessaigne's test for nitrogen. (1)
 c) Briefly explain the principle involved in Kjeldahl's method for the estimation of nitrogen. (2) [March 2012]
28. Carbocations are formed by the heterolytic cleavage of a covalent bond.
 a) What is heterolytic bond fission? (1)
 b) Arrange the following carbocations in the increasing order of stability:
 $(\text{CH}_3)_2\text{CH}^+$, CH_3^+ , $(\text{CH}_3)_3\text{C}^+$, $\text{CH}_3 - \text{CH}_2^+$ (1) [March 2012]
29. A series of organic compounds containing a characteristic functional group and represented by a general formula is called a homologous series.
 a) Classify the following into homologous series and name the series.
 C_3H_8 , $\text{C}_2\text{H}_5\text{Cl}$, C_6H_{14} , $\text{C}_4\text{H}_9\text{Cl}$, $\text{C}_2\text{H}_5\text{OH}$, $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Cl}$, $\text{CH}_3 - \text{CHOH} - \text{CH}_3$ (3)
 b) Write the general formulae of the following homologous series.
 i) Alkynes ii) Alcohols iii) Chloroalkanes (3) [October 2011]
30. Hybridization influences the bond length and bond enthalpy in organic compounds:
 a) Compare the bond length and bond strength of C-H bonds formed by sp and sp^3 hybridized carbon atoms.
 Give reason (2)
 b) How many ' σ ' and ' π ' bonds are present in the following compounds?
 i) $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$
 ii) $\text{CH}_3 - \text{C} \equiv \text{CH}$ (1)
31. Give the IUPAC names of the following:



32. Detection of elements like nitrogen, halogens and sulphur are done by using Lassaigne's test. Discuss the chemistry of Lassaigne's test for the above elements. (6) [September 2010]
33. The bond line representation of cyclopropane is . Write the bond line structures of
- Cyclohexane
 - 2-Bromobutane
 - $\text{CH}_3 - \text{CH}(\text{OH}) - \text{CH}_2 - \text{CHBr} - \text{CH}_3$ (3)
34. The IUPAC name of an organic compound is derived by identifying the functional group and the parent hydrocarbon chain.
- Write the IUPAC name of the following:
- $$\begin{array}{c} \text{CH}_3 \quad \quad \text{CH}_3 \\ | \quad \quad | \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{CH} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$$

 - $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{COOH}$ (2)
- Give the structures of the following compounds:
- 3-Ethyl-4,4-dimethylpentane
 - 6-Methyloctan-3-ol (2) [March 2010]
35. a) Write the IUPAC name of the following compounds :
- $$\begin{array}{c} \text{CH}_3 \quad \quad \text{CH}_2\text{-CH}_3 \\ | \quad \quad | \\ \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH} - \text{CH}_3 \end{array}$$
 - $$\begin{array}{c} (\text{CH}_3)_2\text{CH} - \text{CH}_2 - \text{CH} - \text{CH}_3 \\ | \\ \text{Cl} \end{array}$$
 - 
(3)
- Draw the structure of the molecules represented by the IUPAC names – pent-4-en-2-ol and 3-nitrocyclohexane. (2) [March 2009]
36. You are given a compound containing nitrogen. Explain how you will proceed to determine the Nitrogen content. (4) [June 2008]
37. C_2H_6 and C_5H_{12} are members of a homologous series.
- What is a homologous series? (1)
 - What is the general molecular formula of the above homologous series? (1)
 - What is the significance of $-\text{CH}_2-$ group in homologous series? (1) [February 2008]
