CHEMISTRY

BOOKS - V PUBLICATION

ORGANIC CHEMISTRY SOME BASIC PRINCIPLES AND TECHNIQUES

Question Bank

1. What are hybridisation states of each carbon atom in the following compounds?

$CH_2 = C = O, CH_3CH = CH_2 (CH_3)_2 CO, CH_2 = CHCN, C_6H_6$

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2. Write bond line formulae for (i) isoproyl alcohol, (ii) 2, 3-dimethylbutanal, (iii) heptan-4-one

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3. Which of the following represents the correct IUPAC name for the compounds concerned? 2,2-Dimethylpentane or 2-Dimethylpentane

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4. Write the formulae of the first 5 members of homologous series starting with the underlined $H - COOH$

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5. Give the condensed and bond line formulae and identify the functional groups present if any for 2,2,4-Trimethylpentane

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6. Identify the functional groups in the following compounds.

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7. Which is expected to be more stable, $O_2NCH_2CH_2O$ or CH_3CH_2O and why?

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8. Explain why alkyl groups are electron donors when attached to a π system?

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9. Will CCl_4 give a precipitate of AgCl on heating with $AgNO_3$? Why?

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10. Why is solution of KOH used to absorb CO_2 gas evolved during estimation of carbon in an organic compound?

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11. Why is it necessary to use acetic acid and not H_2SO_4 for acidification of sodium extract for testing sulphur using lead acetate test?

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12. What are electrophiles and nucleophiles? Explain with examples.

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13. Identify the reagents shown in bracketts as nucleophile or electrophile $CH_3COOH + \left[OH^-\right] \rightarrow CH_3COO^- + H_2O$

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14. Classify the reactions in one of the reaction type studied in this unit. $CH_3CH_2Br + \widehat{S}H \rightarrow CH_3CH_2SH + Br^-$

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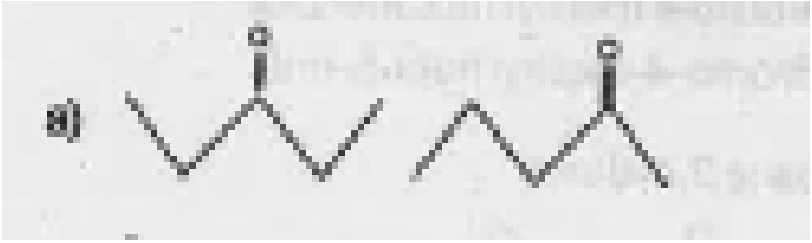
15. What is the relationship between the members of following pairs of structures? Are they structural or geometrical isomers or resonance contributors?

a)



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16. For the following bond cleavages, use curved arrows to show the electron flow and classify each as homolysis or heterolysis.

Identify the reactive intermediates produced in

$$> C = O + \hat{O}H \rightarrow C = O + H_2O$$

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17. The best and latest technique for isolation, purification and separation of organic compounds is: a) Crystallisation b) Distillation c) Sublimation d) Chromatography

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18. Describe the method which can be used to separate two compounds with different solubilities in a solvent S.

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19. What is the difference between distillation, dístillation under reduced pressure and steam distillation?

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20. Detection of elements like nitrogen, halogens and sulphur are done using Lassigne's test. Discuss the chemistry of Lassigne's test for the above elements

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21. Give the principle of estimation of nitrogen by Dumas method.

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22. What is chromatography?

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23. Expain the reason for the fusion of an organic compound with metallic sodium for testing nitrogen, sulphur and phosphorus.

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24. Name a suitable method for separation of components from a mixture of camphor and calcium sulphate.

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25. An organic compound contains 69% carbon and 4.8% hydrogen and the remaining is oxygen. Calculate the mass of CO_2 and H_2O formed when 0.20 g of the compound is subjected to combustion?

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26. A sample of 0.50 g of an organic compound was treated according to Kjeldahl's method. Ammonia evolved was absorbed in 50 mL of 0.5 M H_2SO_4. The residual acid required 60 mL or 0.5 M NaOH solution for neutralisation. Find the percentage composition of nitrogen in the compound.

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27. 0.3780 g an organic compound gave 0.5740 g AgCl in Carius method. Calculate the percentage of chlorine in it.

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28. In Carius method 0.468 g of a compound afforded 0.668 g barium sulphate. Find the percentage of S in the compound.

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29. The best and latest technique for isolation, purification and separation of organic compounds is: a) Crystallisation b) Distillation c) Sublimation d) Chromatography

A. Crystallisation

B. Distillation

C. Sublimation

D. Chromatography

Answer: D

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30. Indicate the sigma and pi bonds in the following molecules :

$C_6H_6, C_6H_{12}, CH_2Cl_2, CH_2 = C = CH_2, CH_3NO_2, HCONHCH_3$

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31. Draw the resonance structures for the following compounds. Show the electron shift using curved-rarr notation.

a) $C_6H_5NO_2$

b) $CH_3CH = CHCHO$

c) C_6H_5OH

d) $C_6H_5 - CHO$

e) $C_6H_5 - (+^)CH_2$

f) $CH_3CH = CHCH_2^+$

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32. Explain 'Inductive effect' and electomeric effect. Which electron displacement explains the following correct orders of acidity of caboxylic acids? $Cl_3\mathbb{C}COOH gr Cl_2CHCOOH gr ClCH_2COOH$

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33. Discuss the principle of estimation of halogens, sulphur and phosphorus present in an organic compound?

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34. Why is nitric acid added to sodium extract before adding silver nitrate for testing halogens?

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35. Explain why an organic liquid vapourises at a temperature below its boiling point in steam distillation.

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36. In the organic compound CH_2=CH-CH_2-CH_2-C -= CH, the pair of hybridised orbitals involved in the formation of: C_2-C_3, bond is

A. sp-sp^2,

B. sp-sp^3

C. s p^2-s p^3

D. sp^3-sp^3

Answer: C

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37. Fill up the balnk. In Lassaigne's test for N, Prussian blue colour is formed due to the formation of .....

A. $Na_4[Fe(CN)_6]$

B. $Fe_4[Fe(CN)_6]_3$

C. $Fe_2[Fe(CN)_6]$

D. $Fe_3[Fe(CN)_6]_4$

Answer: B

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38. Which carbocation is more stable?

A. $(CH_3)_3 CCH_2^+$

B. $(CH_3)_3 C^+$

C. CH_3 CH_2 C H_2^+

D. CH_3 C^+ HCH_2 CH_3

Answer: B

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39. The following reaction is classified as:

$$CH_2CH_2l + KOH(aq) \rightarrow CH_3CH_2OH + KI$$

A. electrophilic substitution

B. nucleophilic substitution

C. elimination

D. addition

Answer: B

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40. In the following table somê mixtures and their methods of separation are given in a wrong order. Match them correctly.

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41. Justify the following statements.

i. Water mixed with formic acid cannot be separated by fractional distillation.

ii. o -nitrophenol is steam volatile while p-nitrophenol is not.

iii. Freshly prepared FeSO_4 solution is insisted during the test for nitrogen in Lassaignes test.

iv. Copper spiral is used in the apparatus for Dumas method.

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42. The mobile and, stationary phases used in different chromatographic techniques are given below in the table. Fill in the blánks.

'(##VPU_HSS_CHE_XI_C12_E02_003_Q01##)'

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43. A mixture contains two components A and B . The solubilities of A and B in water near its boiling point are 10 grams per 100 ml and 2 g per 100 ml respectively. How will you separate A and B from this mixture?

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44. Without using column chromatography, how will you separate a mixture of camphor and benzoic acid?

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45. A mixture containing benzoic acid and nitrobenzene is given to you. Using an appropriate chemicál reagent, how will you proceed to separate them?

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46. By passing chlorine gas through a colourless soluṭion, we get bleaching powder.

(a) What happens if CO_2 is passed instead of Cl_2 ?

(b) When CO_2 is passed in excess, what changes can you observe?

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47. A magnesium compound which is used as purgative in medicine, is converted to MgO on strong heating.

(a) Identify the compound.

(b) Mention any other use of the compound.

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48. The bond line notations of the compound 2 - ethyl -1,1 - dimethyl cyclohexane

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49. How can you detect the presence of nitrogen in an organic compound?

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50. Some organic compounds are given below. Classify them into alkane, alkene and alkyne.

a. CH_4

b. C_2 H_2

c. C_2 H_6

d. C_3 H_4

e. C_(10) H_(22)

f. C_2 H_4

g. .C_3 H_6

h. C_4 H_6

i. C_5 H_(12)

j. C_(20) H_(38)

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51. What is the significance of CH_2 group in homologous series?

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52. Draw the structures of the molecules represented by the IUPAC names, Pent-3-en-1-ol and 2 Nitrocyclohexene

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53. Draw the bond line structure of Cyclohexane

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54. The IUPAC name of an organic compound is derived by identifying the functional group and parent hydrocarbon chain, Write the IUPAC name of $CH_3 - CH = CH - CH_2 - CH_2COOH$

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55. Name the following compounds

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56. Give the structural formula of the following

3 - hydroxy 4 - ethyl heptanoic acid

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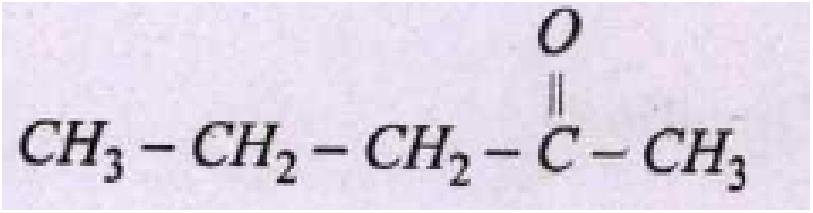
57. Give the IUPAC names of



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58. Outline the structural formulae of

i. 3 - methyl but -1 -yne

ii. But -2- en -1- al

iii. But -2- en -1 - oic àcid

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59. Write the structural fomulae of

a) P - Nitroaniline

b) O - Ethylanisole

c) 2,3 - dibromo -1- phenylpentane

d) 4 - Ethyl-1- fluoro -2- Nitrobenzene

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60. Categorize the following as nucleophile and electrophile : a) HS^- b) BF_3 c) NO_2^+ d) C_2H_5O e) $(CH_3)_3N$ f) NH_2^-

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61. Draw structures of all isomeric ethers corresponding to molecular formula C_5 H_(12) O.

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62. Which is more stable $[(CH_3)_3C^+$ OR $CH_3CH_2^+]$ Give a reason.

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63. Write the names of the compounds represented by the following bond-line notations.

'(##VPU_HSS_CHE_XI_C12_E02_025_Q01##)'

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64. Give the IUPAC names of the following:

'(##VPU_HSS_CHE_XI_C12_E02_026_Q01##)'

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65. Write thẻ IUPAC names of the following compounds

'(##VPU_HSS_CHE_XI_C12_E02_027_Q01##)'

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66. Give structural formullae of the following:

(i) 2-nitropropane

(ii) 2,4 -dinitrohexane

(iii) 3,4 - dimethyl -1,2 - dinitrobenzene

(iv) m-nitroaniline

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67. Sometimes a red colour is not produced in the Lassaignes test even if both nitrogen and sulphur are present in the Organic compound. Explain

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68. Carbon shows tetra covalency. Illustrate with two examples

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69. Give polygon formulae of

(i) Cyclopropane

(ii) Cyclopentane

(iii) Cyclohexanol

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70. Draw Polygon formulae for the molecular formula C_5 H_(10)

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71. Identify the reagents shown in bracketts as nucleophile or electrophile $CH_3COCH_3 + \left[CN^-\right] \rightarrow (CH_3)_2C(CN)(OH)$

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72. How many isomers are possible for monosubstituted and disubstituted benzene?

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73. Which of the following compounds shows geometrical isomerism?

(i) Pent-1-ene

(ii) 2-Methyl but-2-ene

(iii) Pent-2-ene

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74. What is the relationship between the members of following pairs of structures? Are they structural or geometrical isomers or

resonance contributors?

a) 

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75. In which C-C bond of $CH_3CH_2CH_2Br$, the inductive effect is expected tỏ be least?

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76. Write the structural formula of the following compound. Pent-4-en-2-ol

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77. Write the type of hybridisation of each carbon in the compound

$CH_3 - CH = CH - CN$

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78. 0.2475 g of an organic compound gave on combustion 0.4950 g of carbon dioxide and 0.2025 g of water. Calculate the percentage of carbon and hydrogen in it.

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79. During nitrogen estimation of an organic compound by Kjeldahls method, the amimo- nia evolved by 0.5 g of the compound neutralised 10 mL of 1 M H_2 SO_4 . Calculate the percentage of nitrogen in the compound.

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80. In the Carius method of estimation of halogen, 0.15g of an organic compound gave 0.12g of AgBr. Find the peecentage of Br in the compound.

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81. A mixture contains 71 per cent of calcium sulphate and 29 per cent of camphor. Name a suitable technique of separation of the components of the mixture.

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82. Expain the reason for the fusion of an organic compound with metallic sodium for testing nitrogen, sulphur and phosphorus.

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83. Name a suitable technique for separation of the components from a mixture of benzene (b.p.353 K) and aniline (b.p.-457 K)

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84. Which of the following carbocation has the least stability? methyl ethyl isopropyl tert - butyl

A. methyl

B. ethyl

C. isopropyl

D. tert - butyl

Answer: A

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85. The shape of carbocation is?

A. Planar

B. Linear

C. Pyramidal

D. Tetrahedral

Answer: A

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86. The molecule in which the distance between the neighbouring carbon atoms is least is:C_6H_6 C_2H_2 C_2H_4 C_2H_6

A. C_6H_6

B. C_2H_2

C. C_2 H_4

D. C_2 H_6

Answer: B

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87. The hybrid orbitals that will form the compound $CH_3 - C \equiv C - CH_2 - CH_3$ are: $sp^3, sp, sp, sp^2, sp^3, sp^2, sp, sp$

A. s p^3, s p

B. s p, s p^2

C. s p^3, s p^2

D. s p, s p

Answer: A

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88. The IUPAC name for the structural formula:

A. 3,4 -dimethylhexane

B. 2,3 -diethylbutane

C. 2-ethyl-3-methylpentane

D. Heptane

Answer: A

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89. Among the following, the one having longest chain is : neopentane isopentane 2 -methylpentane 2, 2-dimethylbutane

A. neopentane

B. isopentane

C. 2 -methylpentane

D. 2, 2-dimethylbutane

Answer: C

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90. The IUPAC name of compound having formula $(CH_3)_3 C-CH=CH_2$ is : 3,3,3 -trimethyl-1-propene 1,1,1 -trimethyl-3-propene 3,3 -dimethyl-1-bụtene 1,1 -dimethyl-3-butene

A. 3,3,3 -trimethyl-1-propene

B. 1,1,1 -trimethyl-3-propene

C. 3,3 -dimethyl-1-bụtene

D. 1,1 -dimethyl-3-butene

Answer: C

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91. The general formula of cycloalkanes is

A. C_n H_2 n

B. C_2 H_2 n-I

C. C_n H_2 n+1

D. C_n+1 H_n+2

Answer: A

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92. The IUPAC name of the compound CH3-CH=CH-C -= CH is Pent-2-en-4-yne Pent-1-en-4yne Pent-3-en-1-yne Pent-2-en-5-yne

A. Pent-2-en-4-yne

B. Pent-1-en-4yne

C. Pent-3-en-1-yne

D. Pent-2-en-5-yne

Answer: C

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93. The IUPAC name of the compound '(##VPU_HSS_CHE_XI_C12_E03_010_Q01##)'

A. 2 -isoprophylpropane

B. isobutane

C. 2, 3 -dimethyl butane

D. 2, 3-dimethyl hexane

Answer: C

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94. Which of the following is not a cyclic compound?

A. Anthracene

B. Pyrole

C. Phenol

D. Neopentane

Answer: D

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95. Which of the following compound does not have only one type of hybrid carbon atoms?

A. HC -= C-C -= .C H

B. CH_3-CH_2-CH_2-CH_3

C. CH_3-C-=C-CH_3

D. CH_2=CH-CH=CH_2

Answer: C

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96. Which of the following hybridization has maximum s-character?

A. sp

B. sp^2

C. sp^3

D. All have same s-character

Answer: A

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97. The IUPAC name of the compound :

'(##VPU_HSS_CHE_XI_C12_E03_014_Q01##)'

A. 3-oxobutan-1-ol

B. 1 -Hydroxy butan-3-one

C. 4 -Hydroxy butan-2-one

D. 2-oxobutan-4-ol

Answer: C

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98. Which of the following is purified by sublimation if impurities are non-volatile?

A. Cane sugar

B. Naphthalene

C. Urea

D. Acetic acid

Answer: B

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99. The boiling point of glycerol is 563 K but it decomposes below 563 K. It is purified by

A. sublimation

B. vacuum distillation

C. stèam distillation

D. fractional distillation.

Answer: B

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100. A mixture of acetone and methanol can be separated by

A. steam distillation

B. vạcuum distillation

C. fractional distillation

D. sublimation

Answer: C

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101. Dumas method is used for the estimation of (1)Carbon (2)Nitrogen (3)Sulphur (4)Halogens

A. carbon

B. nitrogen

C. sulphur

D. halogens.

Answer: B

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102. In Lassaignes test when both N and S are present blood red colour is obtained. This is due to the formation of (1)Ferric ferrocyanide (2)Ferric cyanide (3)Ferric thiocyanate (4)Ferric hydroxide.

A. ferric ferrocyanide

B. ferric cyanide

C. ferric thiocyanate

D. ferric hydroxide.

Answer: C

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103. Lassigne's solution on treating with sodium nitro prusside solution gives a violet colour indication the presence of _____in the

organic compound.

A. nitrogen

B. sulphur

C. halogen

D. both N and S.

Answer: B

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104. Leibig method is used for the estimation of (1)Nitrogen (2)Carbon and Hydrogen (3)Sulphur (4)Halogens.

A. nitrogen

B. carbon and hydrogen

C. sulphur

D. halogens.

Answer: B

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105. In the Dumas method for the estimation of nitrogen, the gas collected in nitrometer is: (1)N2 (2)NH3 (3)N2+CO2 (4)CO2

A. N_2

B. NH_3

C. N_2+CO_2

D. CO_2

Answer: A

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106. Carius method is used for the estimation of N C and H P halogen

A. N

B. C and H

C. P

D. halogen

Answer: D

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107. 0.4 gm of an organic compound gave 0.188 g of silver bromide by a halogen estimation method. The percentage of bromine in the compound is (at mass of Ag=108, Br=80)

A. 39.8 %

B. 46.0 %

C. 20.0 %

D. 40.0 %.

Answer: C

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108. In the Dumas method for the estimation of nitrogen, 0.84 g of an organic compound gave 448 ml of nitrogen at S.T.P. The percentage of nitrogen in the compound is

A. 0.333

B. 0.667

C. 0.5

D. 0.6

Answer: B

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109. Lassigne's solution on treating with sodium nitro prusside solution gives a violet colour indication the presence of _____in the organic compound.

A. $Na_4[Fe(CN)_5 NOS]$

B. $Na_a[Fe(CN)_5 NOS]$

C. $Na_2[Fe(CN)_5 S]$

D. $Na_4[Fe(CN)_4 S]$.

Answer: A

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110. In the Kjeldahls method, the nitrogen in the organic compound is converted to Ammonium sulphate Ammonia Nitric acid Nitrogen.

A. Ammonium sulphate

B. Ammonia

C. Nitric acid

D. Nitrogen.

Answer: A

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111. Carius method is used for the estimation of N C and H P halogen

A. N

B. C and H

C. P

D. Halogen

Answer: D

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112. Chromatography technique is used for the separation of

A. Small samples of mixtures

B. Dye stuffs

C. Plant pigments

D. All.

Answer: D

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113. 0.395 g of an organic compound by Carius mefhod for the estimation of S gave 0.582 g of BaSO_4 The percentage of S in the compound is

A. 0.2024

B. 0.3562

C. 0.1224

D. 0.4065

Answer: A

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114. The IUPAC name of the compound having the formula:

'(##VPU_HSS_CHE_XI_C12_E03_031_Q01##)'

A. 3,3,3-trimethylprop-1-ené

B. 1,1,1 -trimethylprop-2-ene

C. 3,3-dimethylbut-1-ene.

D. 2,2-dimethylbut-3-ene

Answer: C

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115. The IUPAC -name of the compound, $CH_2=CH-CH(CH_3)_2$ is, 1,1 -dimethylpropene 2 -vinylpropane 3-methylbut-1-ene. 1-isopropylethylene

A. 1,1 -dimethylpropene

B. 2 -vinylpropane

C. 3-methylbut-1-ene.

D. 1-isopropylethylene

Answer: C

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116. The IUPAC name of the ofollowing compound is,

$(\#\#VPU_HSS_CHE_XI_C12_E03_{033}\_Q01\#\#)$

A. 1,2,3 -tricyanopropane

B. 3-cyanopentane- 1,5 -dinitrile

C. 1,2,3 -propanetricarbonitrile

D. propanetricarbylamine

Answer: C

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117. The IUPAC name of the ether, $CH_3OC_2H_5$ is, ethoxymethane methoxyethane methylethyl ether ethylmethyl ether

A. ethoxymethane

B. methoxyethane

C. methylethyl ether

D. ethylmethyl ether

Answer: B

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118. The IUPAC name for,

'(##VPU_HSS_CHE_XI_C12_E03_035_Q01##)'

A. 1,1 -dimethylbutane- 1,3 -diol

B. 4 -methylpentane -2,4 -diol

C. 2-methylpentane-2,4-diol

D. 1,33 -trimethylpropane- 1,3 -diol

Answer: C

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119. The IUPAC name of CH_3-C -= C-CH(CH_3)_2 is,

A. 4-methylpent-2-yne

B. 4,4-dimethylbut-2-yne

C. methylisopropyl acetylenè

D. 2-methylpent-4-yne

Answer: A

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