CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

ORGANIC CHEMISTRY - SOME BASIC PRINCIPLES & TECHNIOUES

Example

1. How many sigma and pi bonds are present in the following molecules :

$(i)CH_3 - CH_3 \quad (ii)CH_3 - OH \quad (iii)CH_2 = CH - C \equiv N \quad (iv)CH$

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2. State the nature of hybridisation of each carbon atom in the following compounds ?

$(a) CH_3Cl \quad (b) (CH_3)_2C = O \quad (c) CH_3 - C \equiv N \quad (d) H - \overset{\overset{O}{\|}}{C} - NH_2$

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3. Rewire the following formulaes with the help of dash formula and also by bond line notations.

$(i) (CH_3)_3CC_2H_5 \quad (ii) CH_3\overset{\overset{O}{\|}}{C}CH_2CH(CH_3)_2 \quad (iii) CH_3CH(OH)C_2H_5$

.

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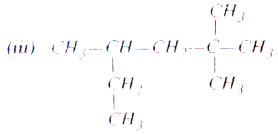
4. Write the IUPAC names of the following compounds

(i) $CH_3 - \underset{\underset{C_2H_5}{|}}{CH} - \underset{\underset{C_2H_5}{|}}{CH} - CH_3$

(ii) $(CH_3)_3CC_2H_5$

(iii) 

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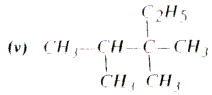
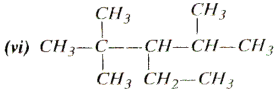
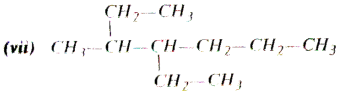
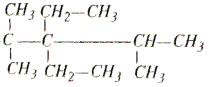
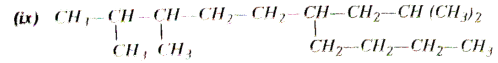
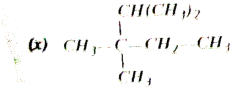
(v) 

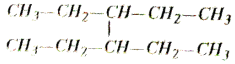
(vi) 

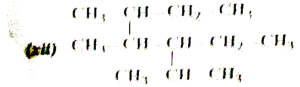
(vii) 

(viii) 

(ix) 

(x) 

(xi) 

(xii) 

(xiii) 

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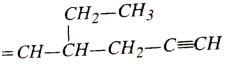
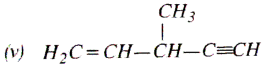
5. Write the IUPAC names of the following :

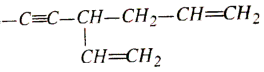
(i) $(CH_3)_2CH-CH=CH_2$

(ii) 

(iii) $CH\equiv C-CH_2-CH_2-CH=CH-CH_3$

(iv) $(CH_3)_3C-CH=CH_2$

(v) 

(vi) 

(vii) $CH_3-CH_2-C\equiv C-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_2}{|}}{CH}}-CH=CH_2$

(viii) $CH_2=CH-CH(CH_3)_2$

(ix) $CH_2=\underset{\underset{CH_3}{|}}{\overset{\overset{CH-CH_3}{|}}{C}}-CH_2-CH_3$

(x) $CH_2=\underset{\underset{CH-(CH_3)_2}{|}}{C}-CH_2-CH_2-CH_3$

(xi) $(CH_3)_3C-CH=CH_2$

(xii) $CH_3(CH_2)_2\underset{\underset{CH=CH_2}{|}}{CH}(CH_2)_3CH_3$

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6. Write the IUPAC names of :

(i) $CH_2=CH-\underset{\underset{OH}{|}}{CH}-CH_3$

(ii) $CH_3-\underset{\underset{NO_2}{|}}{CH}-\underset{\underset{I}{|}}{CH}-\underset{\underset{OH}{|}}{CH}-CH_3$

(iii) $CH_3O-\underset{\underset{OCH_3}{|}}{CH}-CH_2-CH_3$

(iv) $CH_3-CH_2-O-CH_2-CH_2-Br$

(v) $CH_2-\underset{\underset{I}{|}}{CH}-CH_2-\overset{\overset{O}{||}}{C}-H$ (NO_2)

(vi) $CH_3-CH=CH-CHO$

(vii) $C_6H_5-CH=CH-COOH$

(viii) $CH_3-\underset{\underset{CH_3}{|}}{CH}-\overset{\overset{O}{||}}{C}-\underset{\underset{CH_3}{|}}{CH}-OCH_3$

(ix) $CH_3-CH=CH-CH_2-NH_2$

(x) $C_6H_5(CH_2)_2NH_2$

(i) $CH_2=CH-CH-CH_3$ (OH)

(ii) $CH_3-CH(NO_2)-CH(I)-CH(OH)-CH_3$

(iii) $CH_3O-CH(OCH_3)-CH_2-CH_3$

(iv) $CH_3-CH_2-O-CH_2-CH_2-Br$

(v) $CH_2(I)-CH(NO_2)-CH_2-C(=O)-H$

(vi) $CH_3-CH=CH-CHO$

(vii) $C_6H_5-CH=CH-COOH$

(viii) $CH_3-CH(CH_3)-C(=O)-CH(CH_3)-OCH_3$

(ix) $CH_3-CH=CH-CH_2-NH_2$

(x) $C_6H_5(CH_2)_2NH_2$

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7. Draw the structures of the following compounds.

(i) Hex-3-enoic acid, (ii) 2-chloro-2-methylbutan-1-ol

(iii) 5, 5-Diethylnonan-3-ol, (iv) Propane-1, 3-diamine

(v) 4-Nitropent-1-yne, (vi) But-2-ene-1, 4-dioic acid

(vii) 4-Amino-2-ethylpent-2-enal, (viii) Ethyl-3-methoxy-4-nitrobutanoate

(ix) 5-(1-Methylethyl)-3-methyloctane, (x) Hex-4-yn-2-one

(xi) Hepta-1, 4 -dien-3-ol, (xii) 4-Chloropent-2-ene

(xiii) 1-Phenylpropan-2-one, (xiv) 4-Ethyl-2, 6-dimethyldec-4-ene.

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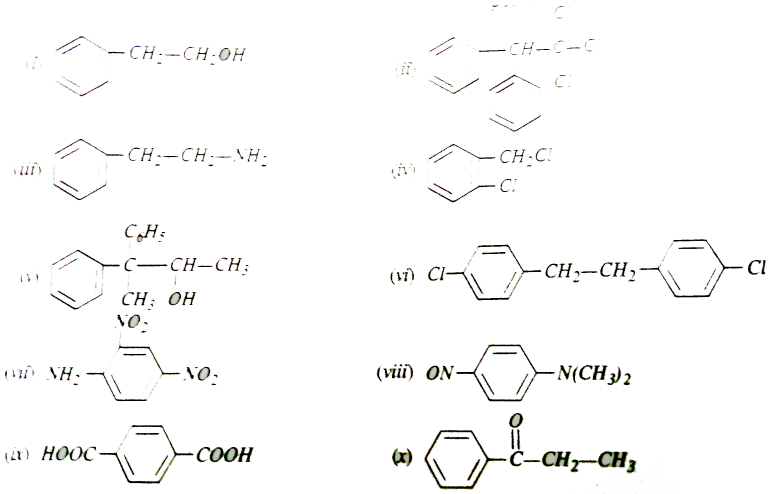
8. Write the IUPAC names of the following compounds.



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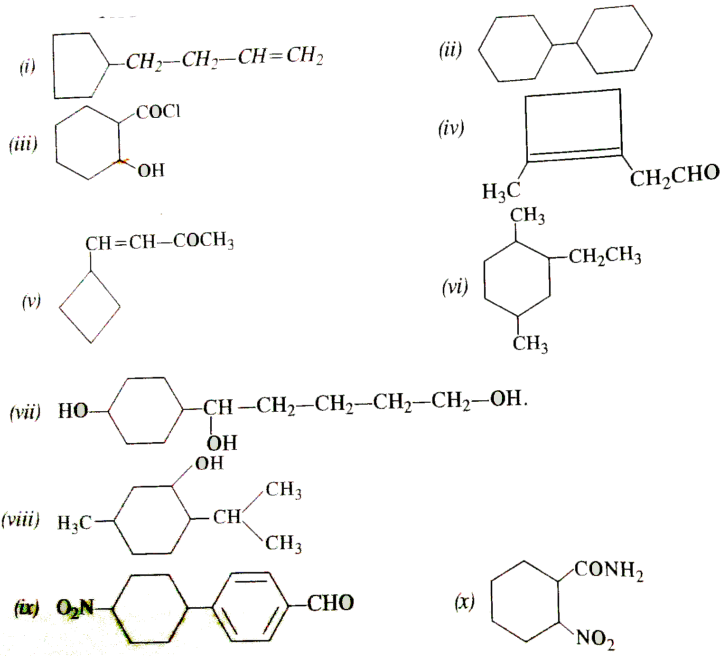
9. Give the IUPAC names of the following :



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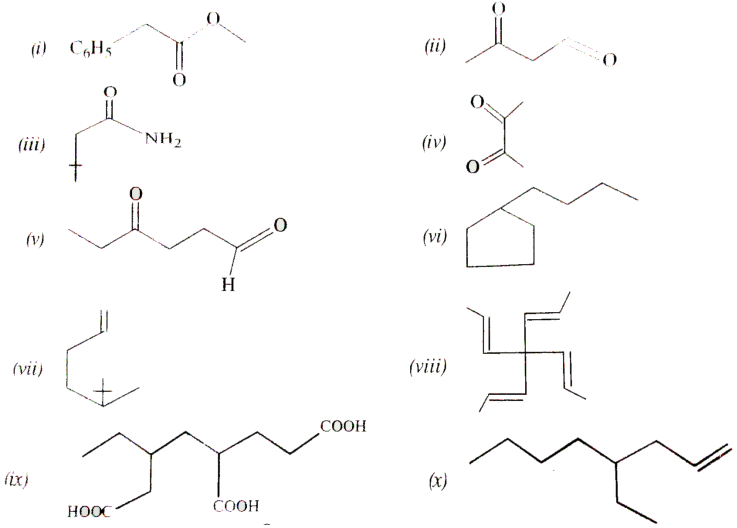
10. Give the structural formula and IUPAC names of the following compounds.



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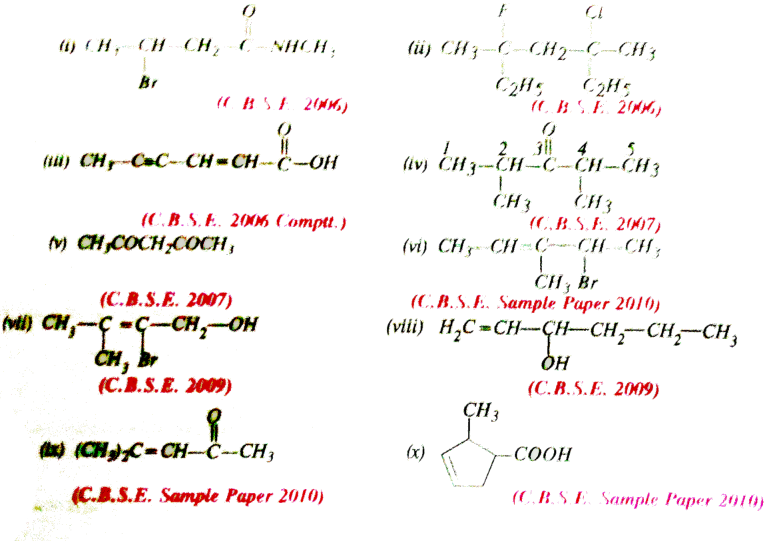
11. Write IUPAC names of the following compounds.



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12. Which structural isomerism is exhibited by the following pairs :

(i) $CH_3 - \overset{O}{\overset{\|}{C}} - OH$ and $H - \overset{O}{\overset{\|}{C}} - O - CH_3$

(ii) $CH_2 = CHOH$ and $CH_3 - \overset{O}{\overset{\|}{C}} - H$

(iii) $CH_3 - CH_2 - CH = CH_2$ and $CH_3 - CH = CH - CH_3$

(iv) $CH_3 - CH_2 - CH_2 - NH_2$ and $CH_3 - \underset{NH_2}{\underset{|}{CH}} - CH_3$

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13. Give the structures and IUPAC names of all the isomeric monochlorobutane.

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14. Write all the acyclic structural isomers with the molecular formula $C_4H_{10}O$. Give their IUPAC names also.

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15. (a) Which of the following are position isomers ?

(i) $CH_2 = \underset{\underset{CH_2 - CH_3}{|}}{CH}$ (ii) $CH_3 - \underset{\underset{CH_2}{||}}{C} - CH_3$ (iii) $CH_3 - CH$

(b) Write the IUPAC name of the functional isomer of $CH_3CH_2CH_2CH_2CHO$.

(c) Which type of structural isomerism is shown by the following pair of compounds ?

$CH_3 - \underset{\underset{Br}{|}}{CH} - CHBr_2$ and $Br_2CH - \underset{\underset{CH_3}{|}}{CH} - Br$

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16. Using curved arrow notation show the formation of reaction intermediates when the following covalent bonds undergo heterolysis.

(i) $H_3C - CH_2 - Cl$ (ii) $H_3C - C \equiv N$ (iii) CH_3ONa

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17. Identify the electrophile centre in the following :

(i) CH_3CHO (ii) $CH_3CH=CH_2$ (iii) CH_3COCH_3

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18. Arrange the following resonating structures in order of increasing stability

$\underset{(I)}{CH_2=\overset{+}{N}=\overset{-}{N}}$ $\underset{(II)}{H_2\overset{+}{C}=N=\overset{-}{N}}$ $\underset{(III)}{H_2\overset{-}{C}-\overset{+}{N}\equiv N}$ $\underset{(IV)}{H_2\overset{-}{C}-N=\overset{+}{N}}$

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19. Arrange the following carbocations in increasing order of stability and mention basis of the order suggested.

(i) $\overset{\oplus}{C}H_3$ (ii) $CH_3\overset{\oplus}{C}H_2$ (iii) $CH_3\overset{\oplus}{C}HCH_3$ (iv) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\oplus}{C}}-CH_3$

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20. when benzyl chloride is boiled with aqueous KOH solution and the solution is acidified by a few drops of dilute HNO_3 followed by $AgNO_3$ solution, a white precipitate is formed. However, no such precipitate is noticed when the reaction is carried with chlorobenzene. explain.

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21. 0.45 g of an organic compound when analysed by combustion gave 1.10 g carbon dioxide and 0.30 g water. Calculate the persentage of carbon and hydrogen in it.

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22. 0.20 g of an organic compound forms 0.5764 g of CO_2 and 0.1512 g of water on combustion. Calculate the percentage of carbon and hydrogen in the compound.

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23. In Duma's method 0.206 g of an organic compound gave $18.8cm^3$ of moist N_2 at $17^\circ C$ and 760 mm Hg pressure. If aqueous at $17^\circ C$ is 14.5 mm Hg, calculate the percentage of nitrogen in the given organic compound.

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24. An organic compound on analysis gave the following data:

(i). 0.25 gm of the compound on complete combustion gave 0.37 gm of CO_2 and 0.2 gm of water.

(ii). 0.25 gm of the compound on analysis by Dumas method gave 32 ml of nitrogen gas at STP.

Calculate the percentages of C, H, N and Oin the organic compounds.

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25. Ammonia produced when 0.75 g of a substance was kjeldahlised neutralised $30cm^3$ of 0.25 NH_2SO_4. Calculate the persentage of nitrogen in the compound.

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26. In Kjeldahl's method, 0.4422 g of an organic compound was digested with conc. H_2SO_4. The ammonia evolved on distilling the resulting solution with excess of $NaOH$ solution was absorbed in 50 mL of 1 N H_2SO_4 solution. The residual acid required 65.5 mL of $N/2$ alkali solution for complete neutralisation. Find the percentage of nitrogen in the given organic compound.

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27. 1.216 g of an organic compound was Kjeldahlised and the ammonia evolved was absorbed in 100 mL of 1-N H_2SO_4. The remaining acid solution was made upto 500 mL by dilution with water. 20 mL of this

diluted solution required 32 mL of $N/10NaOH$ solution for complete neutralisation. calculate the percentage of nitrogen in the compound.

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28. 0.40 g of an organic compound gave 0.30 g of silver bromide by carius method. Determine the percentage bromine in the compound.

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29. In an estimation od sulphur by carius method, 0.2175 g of a compound gave 0.5825 g of barium sulphate. Calculate the percentage of sulphur in the compound.

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30. 0.515 g of an organic compound containing phosphorus gave 0.214 g of magnesium pyrophosphate in Carius method for the estimation of

phosphorus. Calculate the percentage of phosphorus in the given organic compound.

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31. In determination by Victor Meyer method, 0.60 g of a volatile substance expelled 123 mL of air measured over water at $20^{\circ} C$ and 757.4 mm pressure. Find the molecular mass of the substance. Aqueous tension at $20^{\circ} C$ is 17.4 mm.

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32. 0.759 g of silver salt of a dibasic acid was ignited to form 0.463 g of the silver residue. Calculate the molecular mass of the acid.

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33. 0.532 g of the chloroplatinate of a diacid base gave 0.195 g of the platinum residue on ignition. Calaculate the molecular mass of the base.

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34. 0.075 g of a monobasic acid required 10 mL of $N/12NaOH$ solution for complete neutralisation. Calculate the molecular mass of the acid

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35. 7.5 g of an acid are dissolved per litre of the solution. 20 mL of this acid solution required 25 mL of $N/15NaOH$ solution for complete neutralisation. Calculate the equivalent mass of the acid.

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NCERT

1. What are the hydridised states of carbon atoms in the following compounds ?

(i) $CH_2 = C = O$ (ii) $CH_3CH = CH_2$ (iii) $(CH_3)_2C = O$

(iv) $CH = CH_2CN$ (v) C_6H_6

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2. Indicate sigma (σ) and pi (π) bonds in the following molecules :

(i) C_6H_6 (ii) C_6H_{12} (iii) CH_2Cl_2 (iv) CH_3NO_2 (v) $HCONHCH_3$ (vi) $CH_2 = C = CH_2$

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3. Write bond line formulas for :

(i) Isopropyl alcohol (ii) 2, 3-Dimethylbutanal (iii) Heptan-4-one

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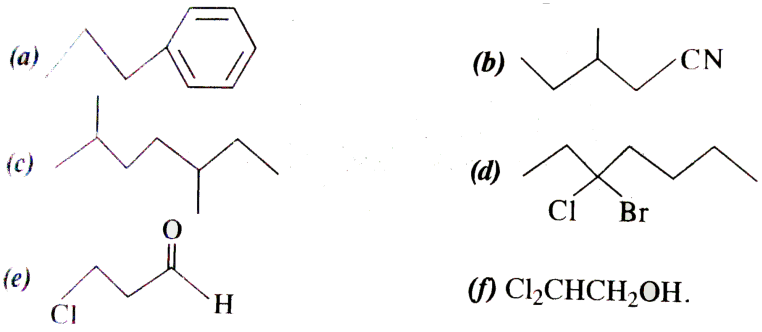
4. Give the IUPAC name of the following compounds :



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5. Which of the following represents the correct IUPAC name of the compounds concerned ?

(a) 2, 2-Dimethylpentane or 2-Dimethylpentane

(b) 2, 3-Dimethylpentane or 3, 4-Dimethylpentane

(c) 2, 4, 7-Trimethyloctane or 2, 5, 7-Trimethyloctane.

(d) But-3-yn-1-ol ot But-4-ol-1-yne

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6. Draw the formulae for the first five numbers of each homologous series beginning with the following compounds:

a. $H - COOH$

b. CH_3COCH_3

c. $H - CH = CH_2$

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7. Give the condensed and bond line formulas for the following compounds :

(i) 2, 2, 4-Trimethypentane (ii) 2-Hydroxy-1, 2, 3-propanetricarboxylic acid (iii) Hexanedial

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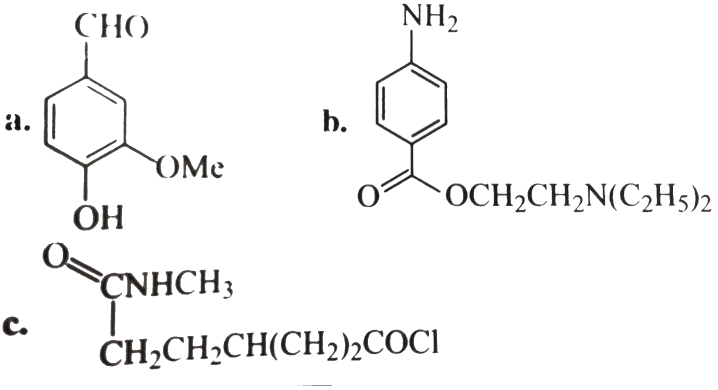
8. Identify the functional groups in the following compounds.



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9. Which is expected to be more stable : $O_2NCH_2CH_2O^-$ or $CH_3CH_2O^-$ and why ?

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10. Draw the resonance structures for the following compounds. Show the electron shift using curved-arrow notation.

(a) C_6H_5OH (b) $C_6H_5NO_2$ (c) $CH_3CH=CHCHO$ (d) C_6H_5-CHO

(e) $C_6H_5-\overset{+}{C}H_2$ (f) $CH_3CH=C\overset{+}{H}CH_2$

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11. Explain why alkyl groups act as electron donors when attracted to a $\pi-system.$

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

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13. Identify the reagents shown in bold in the following equations as nucleophiles or electrophiles.

(a) $CH_3COOH+OH^- \rightarrow CH_3COO^- + H_2O$

(b) $CH_3COCH_3 + NC^- \rightarrow CH_3C(CN)OHCH_3$

(c) $C_6H_6 + CH_3\overset{+}{C}O \rightarrow C_6H_5COCH_3$

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14. Classify the following reactions in one of the reaction type studied in this unit

(i) $CH_3CH_2Br + SH^- \rightarrow CH_3CH_2SH + Br^-$

(ii) $(CH_3)_2C = CH_2 + HCl \rightarrow (CH_3)_2C(Cl)CH_3$

(iii) $(CH_3)_3CCH_2OH + HBr \rightarrow (CH_3)_2CBrCH_2CH_3$

(iv) $CH_3CH_2Br + HO^- \rightarrow CH_2 = CH_2 + H_2O + Br^-$

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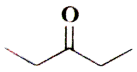
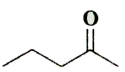
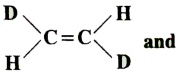
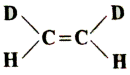
15. What is the relation between the following pairs ?

(a) (a)  and  (b)  and 

(c) $H - \overset{+OH}{\overset{||}{C}} - OH$ and $H - \overset{OH}{\overset{|}{C}} = \overset{+}{O}H$

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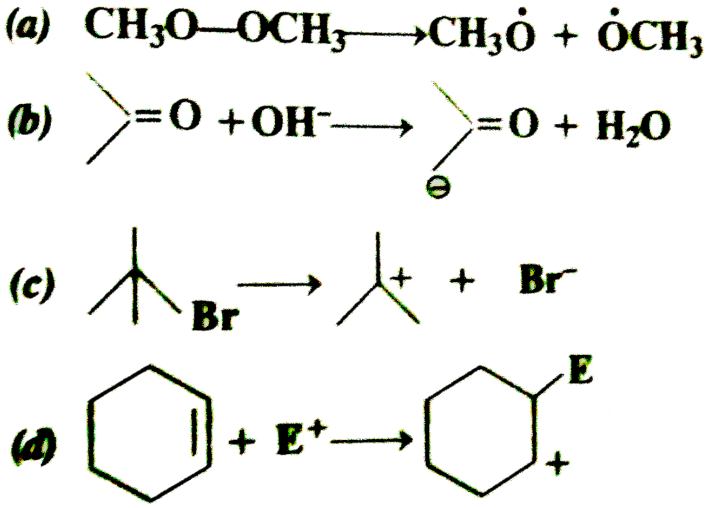
16. Classify each of the following as homolysis as homolysis or heterolysis. Identify the reaction intermediates produced , as free radical, carbocation and carbanion.



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17. Explain the terms inductive and electromeric effects. Which electron displacement effect explains the following correct order of the acidity of the carboxylic acids ?

(a) $CH_3COOH > Cl_2CHCOOH > ClCH_2COOH$

(b) $CH_3CH_2COOH > (CH_3)_2CHCOOH > (CH_3)_3COOH$

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18. Give a brief description of the principle of the following processes taking one example in each case.

(i) Filtration (ii) Recrystallisation (iii) Distillation (iv) Chromatography.

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

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

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21. Describe the chemistry of Lassaigne's tets.

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22. Differentiate between the principle of estimation of nitrogen in an organic compound by (i) Duma's method (ii) Kjeldahl's method.

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23. Describe the principle of estimation of halogens, sulphur and phosphorus present in an organic compound.

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24. Explain the principle of paper chromatography.

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

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26. Why is an organic compound fused with sodium for testing nitrogen, halogens and sulphur ?

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27. Name a suitable technique of the components from a mixture of calcium sulphate and comphor.

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28. An organic liquid vaporises at a temperature below its boiling point in steam distillation. Assign reason.

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29. Carbon tetrachloride does not give a white precipitate upon heating with silver nitrate solution. Is it correct ?

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30. A solution of potassium hydroxide is used to absorb carbon evolved during the estimation of carbon in an organic compound. Explain.

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31. It is not advisable to use sulphuric acid in place of acetic acid for acidification while testing sulphur by lead acetate test. Assign reason.

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32. An organic compound contains 69% carbon and 4.8 % hydrogen, the remainder being oxygen. Calculate the masses of carbon dioxide and water produced when 0.20 g of this compound is subjected to complete combustion.

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33. 0.50 g of an organic compound was kjeldahlished. The ammonia evolved was passed in $50cm^3$ of $1NH_2SO_4$. The residual acid required $60cm^3$ of $N/2NaOH$ solution. Calculate the pecentage of nitogen in the compound.

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34. 0.3780 g of an organic compound gave 0.5740 g of silver chloride in Carius estimation. Calculate the percentage of chlorine in the compound.

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35. In an estimation of sulphur by Carius method, 0.468 of an organic sulphur compound gave 0.668 g of barium sulphate. Find the percentage of sulphur in the compound.

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36. In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$, the $CH - CH_2$ bond is formed by the interaction of a pair of hybridised orbitals :

A. $sp - sp^2$

B. $sp - sp^3$

C. $sp^2 - sp^3$

D. $sp^3 - sp^3$.

Answer: C

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37. In the Lassaigne's test for nitrogen in an organic compound, the Pressian blue colour is obtained due to the formation of :

A. $Na_4\left[Fe(CN)_6\right]$

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

C. $Fe_2\left[Fe(CN)_6\right]$

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

Answer: B

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38. Which of the following carbocation is most stable?

A. $(CH_3)_3\overset{\oplus}{C}CH_2$

B. $(CH_3)_3\overset{\oplus}{C}$

C. $CH_3CH_2\overset{\oplus}{C}H_2$

D. $CH_3\overset{\oplus}{C}HCH_2CH_3$.

Answer: B

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39. The best and latest technique for isolation, purification and separation of organic compound is

A. Crystallisation

B. Distillation

C. Sublimation

D. Chromatography.

Answer: D

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40. The following reaction is classified as :

$$CH_3CH_2I + KOH(aq) \rightarrow CH_3CH_2OH + KI$$

A. electrophilic substitution

B. nucleophilic substitution

C. elimination

D. addition

Answer: B

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Short Answer Type Question

1. Which of the above compounds from pairs of metamers ?

(I) $CH_3\ CH_2\ CH_2\ CH_2\ OH$

(II) $CH_3 - CH_2 - \underset{\displaystyle OH}{\underset{|}{CH}} - CH_3$

(III) $CH_3 - \underset{\displaystyle OH}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}} - CH_3$

(IV) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - OH$

(V) $CH_3 - CH_2 - O - CH_2 - CH_3$

(VI) $CH_3 - O - CH_2 - CH_2 - CH_3$

(VII) $CH_3 - O - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_3$

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2. Identify the teritary alcohol and write its IUPAC name.

(I) $CH_3\ CH_2\ CH_2\ CH_2\ OH$

(II) $CH_3 - CH_2 - \underset{\displaystyle OH}{\underset{|}{CH}} - CH_3$

(III) $CH_3 - \underset{\displaystyle OH}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}} - CH_3$

(IV) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - OH$

(V) $CH_3 - CH_2 - O - CH_2 - CH_3$

(VI) $CH_3 - O - CH_2 - CH_2 - CH_3$

(VII) $CH_3 - O - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_3$

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3. Identify the primary alcohols from the given list.

(I) $CH_3-CH_2-CH_2-CH_2-OH$

(II) $CH_3-CH_2-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$

(III) $CH_3-\underset{\displaystyle OH}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-CH_3$

(IV) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-OH$

(V) $CH_3-CH_2-O-CH_2-CH_3$

(VI) $CH_3-O-CH_2-CH_2-CH_3$

(VII) $CH_3-O-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

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4. What is the relation in all these compounds ?

(I) $CH_3-CH_2-CH_2-CH_2-OH$

(II) $CH_3-CH_2-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$

(III) $CH_3-\underset{\displaystyle OH}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-CH_3$

(IV) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-OH$

(V) $CH_3-CH_2-O-CH_2-CH_3$

(VI) $CH_3-O-CH_2-CH_2-CH_3$

(VII) $CH_3-O-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

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5. For testing halogens in an organic compound with $AgNO_3$ solution, sodium extract (Lassaigne's test) is acidified with dilute HNO_3. What will happen if a student acidifies the extract with dilute H_2SO_4 in place of dilute HNO_3 ?

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6. What is the hybridisation of each carbon in $H_2C = C = CH_2$.

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7. Explain, how is the electronegativity of carbon atoms related to the state of hybridisation in an organic compound ?

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8. Show the polarisation of carbon-magnesium bond in the following structure.

$CH_3 - CH_2 - CH_2 - CH_2 - Mg - X$

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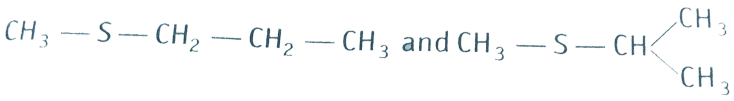
9. Compounds with same molecular formula but differing in their structures are said to be structural isomers. What type of structural isomerism is shown by



A. Position isomer

B. Functional Isomer

C. Tautomer

D. Both A & C

Answer: A

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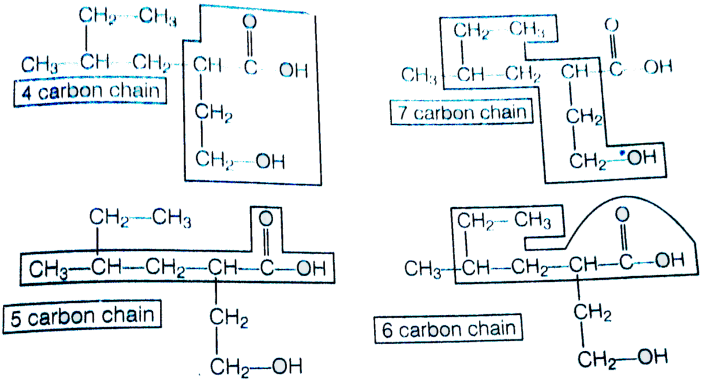
10. Which of the following selected chains is correct to name to given compound according to IUPAC system ?



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11. In DNA and RNA, nitrogen atom is predent in the ring system. Can kjeldahl's method be used for the estimation of nitrogen present in these ? Give reasons.

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12. If a liquid compound decomposes at its boiling point, which method (s) can you choose fot its purification. It is known that the compound is stable at low pressure, steam volatile and insoluble in water.

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13. Draw the possible resonance for $CH_3 - \ddot{O} - \overset{+}{C}H_2$ and predict which of the structures is more stable. Give reason for your answer.

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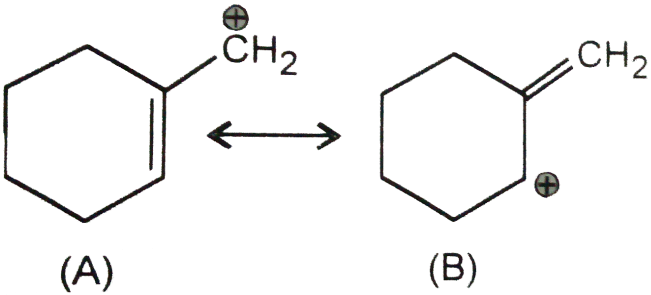
14. Which of the following ions is more stable ?



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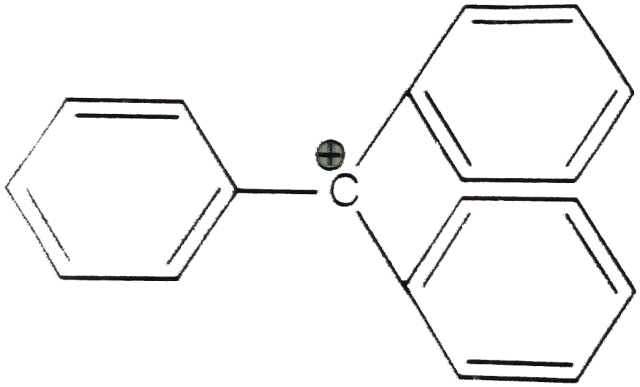
15. The structure of triphenylmethyl cation is given below. This is very stable and some of its salts can be stored for months. Explain the cause of high stability of this cation.



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16. Write structures of various carbocations that can be obtained from 2-methylbutane. Arrange these carbocations in order or increasing stability.

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17. Three students, Manish, Ramesh and Rajini were determining the extra elements present in an organic compound given by their teacher. They prepared the Lassaigne's extract (L.E.) independently by the fusion of the compound with sodium metal. Then they added solide $FeSO_4$ and dilute sulphuric acid to a part of Lassaigne's extract. Manish and Rajni obtained prussian blue colour but Ramesh got red colour.

Ramesh repeated the test with the same Lassaigne's extract, but again got red colour only. They were surprised and went to their teacher and told him about their observation. Teacher asked them to think over the reason for this. Can you help them by giving the reason for this observation. Also, write the chemical equations to explain the formation of compounds of different colour.

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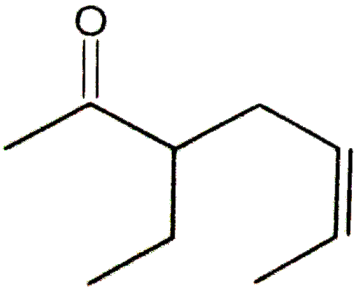
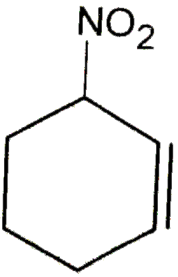
18. Name the compounds whose line formulae are given below :



(i)



(ii)

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19. Write structural formulae for compounds named as

(a) 1-Bromoheptane

(b) 5-Bromoheptanoic acid

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20. Draw the resonance structure of the following compounds :

(i) $CH_2 = CH - \ddot{\underset{\cdot\cdot}{C}}l:$ (ii) $CH_2 = CH - CH = CH_2$ (iii)

$$CH_2 = CH - \overset{\overset{O}{||}}{C} - H$$

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21. Identify the most stable species in the following set of ions giving reasons

(a) $\overset{+}{C}H_3, \overset{+}{C}H_2Br, \overset{+}{C}HBr_2, \overset{+}{C}Br_3$ (b) $\overset{\Theta}{C}H_3, \overset{\Theta}{C}H_2Cl, \overset{\Theta}{C}HCl_2, \overset{\Theta}{C}Cl_3$

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22. Given three points of differences between inductive effect and resona effect.

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23. Which of the following compounds will not exist as resonance hybrid. Give reason for your answer.

(a) CH_3OH

(b) $R - CONH_2$

(c) $CH_3CH = CHCH_2NH_2$

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24. Why does SO_3 act as an electrophile ?

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25. Resonance structures of propenal are given below. Which of these resonating structures is more stable ? Give reason for your answer.

$$\underset{\text{I}}{CH_2 = CH - CH = O} \leftrightarrow \underset{\text{II}}{\overset{\oplus}{C}H_2 - CH = CH - \overset{\ominus}{O}}$$

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26. By mistake, an alcohol (boiling point $97^\circ C$) was mixed with a hydrocarbon (boiling point $68^\circ C$). Suggest a suitable method to separate the two compounds. Explain the reason for your choice.

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27. Which of the two structures (A) and (B) given below is more stabilised by resonance ? Explain

$\underset{(A)}{CH_3COOH}$ and $\underset{(B)}{CH_3COO^-}$

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28. What is meant by hybridisation ? Compound $CH_2 = C = CH_2$ contains sp or sp^2 hybridised carbon atoms. Will it be a planar molecule ?

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29. Benzoic acid is an organic compound. Its crude sample can be purified by crystallisation from hot water. What characeteristic difference in the properties of benzoic acid and the impurity make this process of purification suitable ?

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30. Two liquids (A) and (B) can be separated by the method of fractional distillation. The boiling point of liquid (A) is less than boiling point of liquid (B). Which of the liquids do you expect to come out first in the distillate ? Explain.

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31. You have the mixture of three liquids (A), (B) and (C). There is a large difference in the boiling points of (A) and rest of the two liquids i.e. (B) and (C). Boiling point of liquids (B) and (C) are quite close. Liquid [A] boils at a higher temperature than [B] and [C] and boiling point of (B) is lower than that of (C). How will you separate the components of the mixture. draw a diagram showing set up of the apparatus for the process.

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32. Draw a diagram of bubble plate type fractionating column. When do we require such type of a column for separating two liquids. Explain the principle involved in the separation of components of a mixture of liquids by using fractionating column. What industrial applications does this process have ?

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33. A liquid with high boiling point decomposes on simple distillation but it can be steam distilled for its purification. Explain how is it possible ?

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Concept Based Question

1. Ethyne is a stronger acid than propyne. Explain.

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2. Electromeric effect is a temporary effect. Assign reason.

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3. Alcohols are weaker acids than water. Why ?

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4. Ethylamine is a stronger base than acetamide. Assign reason.

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5. Higher alkyl substituted alkene is formed in greater proportion than the lower alkyl substituted alkene. Justify.

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6. Benzyl carbocation is more stable than ethyl carbocation. Justify.

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7. How will you separate a mixture of benzoic acid and naphthalene ?

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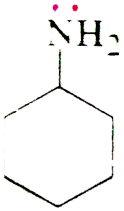
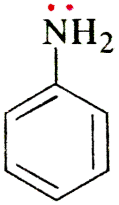
8. Cyclohexylamine is more basic than aniline. Explain



Cyclohexylamine



Aniline

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9. What happends when :

(a) Aqueous solution of lead acetate and sodium sulphide are mixed with

each,

(b) A few drops of sodium nitroprusside are added to the aqueous solution containing sodium suphide.

(c) An aqueous solution containing sodium iodide is treated with a few drops of CS_2 followed by excess of chlorine water.

(d) Phoshorus is fused with sodium peroxide

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10. Fluorine is more electronegative than chlorine but p-fluorobenzoic acid is a weaker acid than p-chlorobenzoic acid. Explain.

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11. The enthalpy of hydrogenation of but $-1-$ ene is $125.8kJmol^{-1}$ but that of but $-2-$ ene is nearly $120.0kJmol^{-1}$. How will justify ?

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12. Predict the nature of the $M-$ effect when 'Cl' and $'NO_2'$ groups are attached to the benzene ring. Write the different resonating structures.

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13. Arrange the following in order of increasing acidic strength

(i) $HCOOH, ClCH_2COOH, CH_3COOH$

(ii) $CH_3COOH, (CH_3)_2CHCOOH, (CH_3)_3\mathbb{C}OOH$

(iii) $ClCH_2COOH, Cl_2CHCOOH, ClCl_3C.COOH$

(iv)

$ClCH_2COOH, CH_3CH_2COOH, ClCH_2CH_2COOH, (CH_3)_2CH.COOH$

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14. Dissociation constant of benzoic acid, $p-$ nitro benzoic acid and $p-$ hydroxy benzoic acid are $6.3\times10^{-5}, 36\times10^{-5}$ and $, 2.5\times10^{-5}$ respectively. Explain

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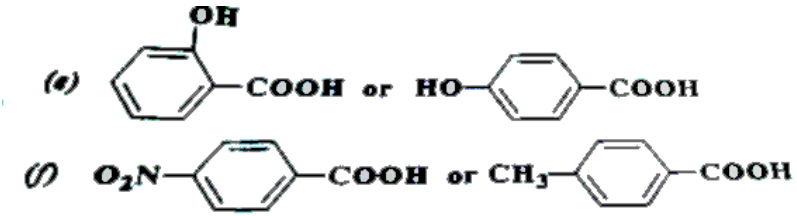
15. Which out of each pair is expected to be a stornger acid ?

(a) CH_3COOH or $HCOOH$, (b) CH_3COOH or C_6H_5OH

(c) C_6H_5COOH or $HCOOH$, (d) $CH_2(Cl)COOH$ or $CH_2(Br)COOH$



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16. Pick the electrophiles and nucleophiles from the following :

(a) NH_3 (b) NO_2^+ (c) CN^- (d) RNH_2 (e) SO_3 (f) ROH (g) RO^- (h) $FeCl_3$

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17. Which of the following statemets are false ? Assign suitable explanation wherever possible.

(a) Beilstein test is a reliable test for halogens in organic compounds.

(b) The presence of nitrogen in Lassaigne's test can be shown with the help of Prussian blue colour.

(c) Lassaigne's test for the detection of sulphur fails if the compound is of volatile nature.

(d) If the compound contains both N and S, then a brick red colour is obtained in the Lassaigne's test.

(e) Methods are available to detect oxygen in a compound.

(f) Naphthalene can be separated from ammonium chloride by sublimation method.

(g) The coloured impurities present in an organic compound can be removed with the help of animal charocal.

(h) A mixture of $o-$ nitrophenol and $p-$ nitrophenol can be separated by steam distillation

(i) Chromatographic methods can be used to purify impure compounds available in any amount.

(j) The purpose of boiling Lassaigne's extract with conc. HNO_3 before testing for halogens is to destroy any Na_2S or $NaCN$ if formed in the reaction

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18. Suggest a method to separate the constituents from the following mixture :

(i) Mixture of two miscible liquids.

(ii) A mixture of oil and water.

(iii) A mixture of plant pigments.

(iv) A mixture of ether and water.

(v) A mixture of solid nemzoic acid and sodium chloride.

(vi) o-nitrophenol and p-nitrophenol present in a mixture.

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19. How will you separate the constituents from a mixture of H_2S and SO_2 ?

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20. Point out the false statements from the following and rectify them :

(a) The members in a homologous series can be represented by same general formula.

(b) C_nH_{2n} is the general formula for the members of alkane familt.

(c) Prefixes n-, iso-, tert-, neo- etc. are used in the IUPAC names of the compounds.

(d) Neohyfrocarbon contains a tertiary carbon atom.

(e) Propane consists of two primary and one secondary carbon atoms.

(f) Chemical properties of compounds are those of the functional groups.

(g) CHO group gets priority over $COOH$ group in writing the IUPAC names of the compounds.

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21. Select the principal functional group when the following groups are present in the molecule :

(a) $-OH,\ -COOH,\ -NO_2$

(b) $-OCH_3, OH,\ -Cl$

(c) $-CHO,\ -CN,\ -OH$

(d) $-Cl,\ -CONH_2,\ -CHO$

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22. Give the names of the following when these are not the part of the parent chain :

$CH_2 = , CH_3CH = , CH_2 = CH - , CH_2 = CH - CH_2 -$

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23. Give the names as secondary suffixes and primary suffixes for the following :

$-COOH,\ -CHO,\ -CN,\ -OH,\ -NH_2$

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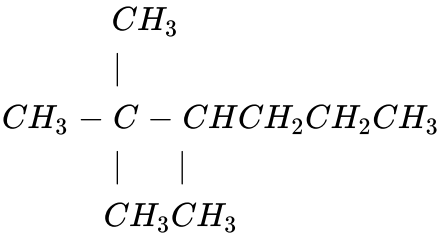
24. Designate each carbon atom as primary, secondary, tertiary and quanternary in the following :

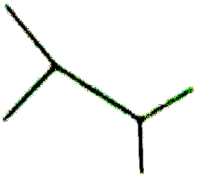
(a)



(b)

(b)

(c)



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25. A certain substance contains only carbon and hydrogen and its molecular mass is 70. Photochlorination gave only one monochloride. Write the structure and the IUAC name of the substance and its monochloride.

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26. Can we separate two liquids A (b.p. 353 K) and B (b.p. 365 K) present in a mixture by simple distillation ?

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27. Under what condition can the process of steam distillation be used ?

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28. Lassaigne's extract is prepared in distilled water and not in tap water. Explain.

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29. Why is impure glycerol by distillation under reduced pressure ?

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30. Hydrazine does not give Lassaigne's test for nitrogen. Why ?

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31. Can we use potassium in place of sodium for preparing Lassaigne's extract ?

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32. Do we collect the vapours of the volatile substance in the Victor Meyer's experiment ?

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33. Lassaigne's test is not very successful for diazonium salts. Assign reason.

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34. (a) Write IUPAC names of the following compounds :

(i) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - COOH$ (ii) $CH_3 - C \equiv C - C \equiv C - CH_3$

(b) Define inductive effect.

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35. (a) What are electrophiles ? Give example.

(b) Describe the chemistry of Lassaigne's test for the detection of halogens.

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36. What all the acylic structural isomers with the molecular formula $C_4H_{10}O$. Give their IUPAC names also.

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37. Write structureal formula of (a) Neopentane (b) Chlorobenzene (c) Propane.

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38. (a) What is chromatography ?

(b) What is inductive effect ?

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39. Write structural formulae of all isomers of C_6H_{14}. Give their IUPAC names also.

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40. Describe the chemistry of Lassaigne's test used for the detection of nitrogen.

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41. Write IUPAC names of the following compounds.

(i) $CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{C} = CH - CH_3$ (ii)

$CH_3 - CH_2 - CH_2 - \underset{\underset{C_2H_5}{|}}{CH} - CH_2 - COOH$

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42. Write IUPAC name of : $(CH_3)_2C = CHCHO$.

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43. What is inductive effect ? Explain

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44. What is sublimation?

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45. Compounds having the same molecular formula but different structures are classified as structural isomers. Structural isomerism include chain, position, functional, group isomerism and metamerism.

answer the following questions on the basis of above paragraph :

(i) What is functional isomerism ?

(ii) $CH_3OC_3H_7$ and $C_2H_5OC_2H_5$ represent which type of isomers ?

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Value Based Question

1. Chromatography is a recent and most effective technique which was used by Tsweff, a botanist for the separation of coloured substances into individual constutients. The name Chromatography means colour writing (In Greek , Chrome = colour, graphy = writing). However, the name as such has lost its significance. The technique can be used to separate

constituents from any mixture whether coloured or colourless.

(i) What is the basic of Chromatographic separation ?

(ii) What is the value associated with it ?

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2. A student was asked by his teacher to separate an impure sample of sulphur containing sand as the impurity. He tried to purify it with the help of sublimation. But he was not successful. Particles of sulphur of sulphur could not be separated completely from sand.

(i) Why did the sublimation process succeed ?

(ii) Suggest an alternate method to affect the separation.

(iii) What is the value based information associated with this ?

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3. Amit was asked by his teacher to separate a liquid mixture of acetone and ethyl alcohol. He set up a distillation apparatus and tried to distil the mixture. To his surprise, both the liquids got distilled. Teacher told Amit

to repeat the experiment by using a fractionating column in the distillation flask. Amit followed the advice of the teacher and was able to separate the two liquids.

(i) Why was Amit not successful in separating the liquid mixture earlier ?

(ii) Why did teacher ask him to use the fractionating column ?

(iii) Which liquid was distilled first ?

(iv) As a student of chemistry, what value based information you have gathered ?

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Problems For Practice

1. What is the difference in the molecular formula of the two successive members in a homologous family ?

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2. The molecular formula of the first member of alkyne family is C_2H_2. What is the formula of the fourth member ?

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3. In the name cyclobutane for a compound, what does cyclo represent ?

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4. Give the IUPAC name of third member of the alkanol family.

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5. Can an organic compound have two OH groups attached to the same carbon atom ?

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6. What is the IUPAC name of the compound $(CH_3)_2NC_2H_5$?

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7. In the IUPAC name methoxyethane for an ether, what does methoxy represent ?

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8. Suggest anoth name for nitroethane.

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9. How will you purify a simple of benzoic acid containing sodium chloride as impurity ?

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10. Suggest a method to purify impure naphthalene.

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11. Can we purify impure sugar by sublimation process ?

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12. How will you purify impure sample of benzene ?

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13. You are given a mixture of acetone and methyl alcohol. How will you separate them ?

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14. How is aniline purified ?

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15. Suggest a method to deparate a mixture of o-nitrophenol and p-nitrophenol.

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16. Can glycerol be purified by simple distillation ?

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17. How will you separate a mixture of two solids which differ in their solubilities in the same solvent ?

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18. Can we separate a mixture of benzoic acid and camphor by sublimation ?

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19. Which reagent is used to detect hydrogen in an organic compound ?

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20. What is prussian blue ?

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21. Name a compound which does not contain halogen but gives positive Beilestein test.

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22. Will $NaCN$ give a positive Lassaigne's test for nitrogen ?

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23. Which colour will appear in the Lassaigne's test if the compound contains both nitrogen and sulphur ?

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24. Will a precipitate appear when silver nitrate is added to carbon tetrachloride ?

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25. Can we detect oxygen in a compound by Lassaigne's test ?

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26. Why is Lassaigne's extract prepared in distilled water ?

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27. 0.2475 gm of an organic substance gave on combustion 0.495 gm of CO_2 and $0.2025gm$ of H_2O. Calculate the percentange of carbon and hydrogen in it.

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28. 0.378 g od an organic compound containing carbon and hydrogen was subjected to cobustion by Liebig's method , the CO_2 and H_2Oformed were passed through potash bulbs and $CaCl_2$ (anhydrous) tube. At end of the experiment, the increase in the respective weights were 0.264 g and 0.162 g. Calculate the percentage of carbon and hydrogen.

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29. An organic compound gave the following results on analysis, 0.2496 g of the compound gave 0.3168 g of CO_2 and 0.0864 g of H_2O. Calculate the percentage of carbo and hydrogen in the compound.

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30. 0.2325 g of an organic compound was analysed for nitrogen by Duma's method. 31.7 mL of moist nitrogen gas was collected at $25^\circ C$ and 755.8 mm Hg pressure. Determine the percentage of nitrogen in the compound. The aqueous tension of water is 23.8 mm Hg at $25^\circ C$.

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31. In Duma's method, 0.3 g of an organic compound gave $50cm^3$ of nitrogen collected at 300 K and 715 mm pressure. Calculate the percentage of nitrogen in the compound. Aqueous tension of water at 300 K is 15 mm.

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32. 0.2046 g of an organic compound gave $30.4cm^3$ of moist nitrogen measured at 288 K and 732.7 mm pressure. Calculate the percentage of nitrogen in the compound (Aqueous tension at 288 K is 12.7 mm)

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33. 0.35 g of an organic acid was kjeldahlised and the ammonia obtained was passed into $100cm^3$ of $N/5H_2SO_4$. The excess of the acid required $154cm^3$ of $N/10NaOH$ for neutralisation. Calculate the percentage of nitrogen in the compound.

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34. 0.15 g of an organic compound gave 0.12 g of silver bromide by carius by carius method. Find out the percentage of bromine in the compound.

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35. 0.1890 g of organic compound containing chlorine gave in carius method 0.2870 g of silver chloride. Find the percentage of chlorine in the compound.

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36. 0.2595 g of organic compound when treated by carius method gave 0.35 g of $BaSO_4$. Calculate the percentage of sulphur in the compound.

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37. 0.395 g of an organic compound by carius method for the estimation of sulphur gave 0.582 g of $BaSO_4$. Calculate the percentage of sulphur in the compound.

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38. 0.1570 g of an organic compound was heated with fuming nitric acid in carius tube. Addition of excess of barium chloride yielded 0.4813 g of barium sulphate as a white precipitate. Determine the percentage of sulphur in the compound.

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39. 0.3160 g of an organic substance was heated with fuming nitric acid in a carius tube to convert phosphorus present into phosphoric acid. Addition of magnesia mixture formed $MgNH_4PO_4$ which upon heating gave $0.1697 g Mg_2P_2O_7$. Calculate the percentage of phosphorus in the compound.

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Ncert Exemplar Problems

1. Which of the following is the correct IUPAC name ?

A. 3-Ethyl-4, 4-dimethylheptane

B. 4, 4-Dimethyl-3-ethylheptane

C. 5-Ethyl-4, 4-dimethylheptane

D. 4, 4-Bis (methyl) 3-ethylheptane

Answer: A

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2. The IUPAC name for

$CH_3 - \overset{O}{\overset{||}{C}} - CH_2 - CH_2 - \overset{O}{\overset{||}{C}} - OH$ is :

A. 1-Hydroxypentane-1, 4-dione

B. 1, 4-Dioxopentanol

C. 1-Carboxybutan-3-one

D. 4-Oxopentanoic acid

Answer: D

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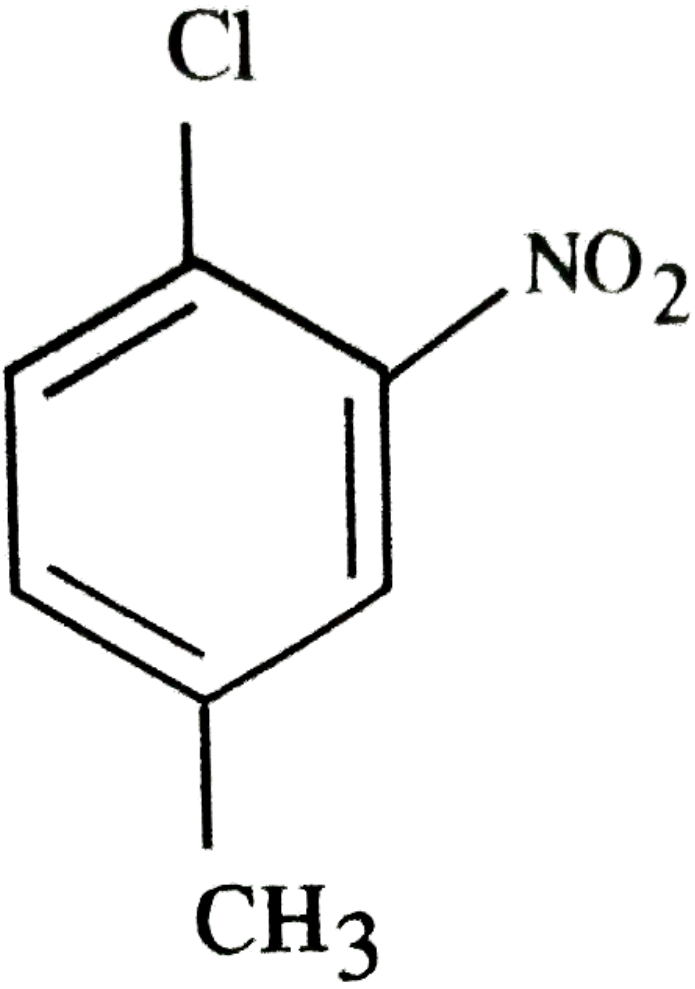
3. The IUPAC name for



is

A. 1-Chloro-2-nitro-4-methylbenzene

B. 1- Chloro-4-methyl-2-nitrobenzene

C. 2-Chloro-1-nitro-5-methylbenzene

D. m-Nitro-p-chlorotoluene

Answer: B

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4. Electronegativity of carbon atoms depends upon their state of hybrisation. In which of the following compounds, the carbon marked with asterisk is most electronagative ?

A. $CH_3 - CH_2 -^* CH_2 - CH_3$

B. $CH_3 -^* CH = CH - CH_3$

C. $CH_3 - CH_2 - C \equiv^* CH$

D. $CH_3 - CH_2 - CH =^* CH_2$

Answer: C

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5. In which of the following functional groups, isomerism is not possible ?

A. Alcohols

B. Aldehydes

C. Alkyl halides

D. Cyanides

Answer: C

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6. The fragrance of flowers is due to the presence of some steam volatile organic compounds called essential oils. These are generally insoluble in water at room temperature but are miscible with water vapours in vapour phase. A suitable method for the extraction of these oils from the flowers is :

A. Distillation

B. Crystallisation

C. Distillation under reduce pressure

D. steam distillation

Answer: D

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7. During hearing of a court case, the judge suspected that some changes in the documents had been carried out. He asked the forensic department to check the ink used at two different places. According to you which technique can give the best results ?

A. Column chromatography

B. Solvent extraction

C. Distillation

D. Thin layer chromatography

Answer: D

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8. The principle involved in paper chromatography is

A. Adsorption

B. Partition

C. solubility

D. Volatility

Answer: B

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9. What si the correct order of decreasing stability of the following carbocations.

$CH_3 - \overset{\oplus}{\underset{I.}{C}}H - CH_3$ $CH_3 - \overset{\oplus}{\underset{II.}{C}}H - OCH_3$

$CH_3 - \overset{\oplus}{\underset{III.}{C}}H - CH_2 - OCH_3$

A. $II > I > III$

B. $II > III > I$

C. $III > I > II$

D. $I > II > III$

Answer: A

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10. Correct IUPAC name for

$$H_3C - \underset{\underset{C_2H_5}{|}}{CH} - \underset{\underset{C_2H_5}{|}}{CH - CH_3}$$ is

A. 2-Ethyl-3-methylpentane

B. 3, 4-Dimethylhexane

C. 2-sec-butylbutane

D. 2, 3-Dimethylbutane

Answer: B

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11. In which of the following compounds the carbon marked with asterisk is expected to have greatest positive charge ?

A. $CH_3 - {}^*CH_2 - Cl$

B. $CH_3 - {}^*CH_2 - Mg^+Cl^-$

C. $CH_3 - {}^*CH_2 - Br$

D. $CH_3 - {}^*CH_2 - CH_3$

Answer: A

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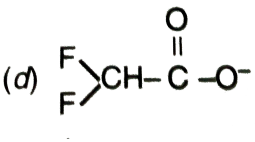
12. Ionic species are stabilised by the dispersal of charge which of the following carboxylate ions is the most stable ?

A. $CH_3 - \overset{O}{\overset{||}{C}} - O^-$

B. $Cl - CH_2 - \overset{O}{\overset{||}{C}} - O^-$

C. $F - CH_2 - \overset{O}{\overset{||}{C}} - O^-$

D. 

Answer: D

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13. Electrophillic addition reaction proceed in two steps. The first step involves the addition of an electrophile. Name the type of intermediate formed in the first step of the following addition reaction.

$H_2C - HC = CH_2 + H^+ \rightarrow$?

A. 2° Carbanion

B. 1° Carbocation

C. 2° Carbocation

D. 1° Carbanion

Answer: C

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14. Covalent bond undergo fission in two different ways. The correct representation involving a heterolytic fission of $CH_3 - Br$ is

A. $CH_3 - Br \rightarrow \overset{\oplus}{C}H_3 + Br^{\ominus}$

B. $CH_3 - Br \rightarrow \overset{\oplus}{C}H_3 + Br^{\ominus}$

C. $CH_3 - Br \rightarrow \overset{\ominus}{C}H_3 + Br^{\ominus}$

D. $CH_3 - Br \rightarrow \dot{C}H_3 + Br^{\cdot}$

Answer: B

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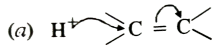
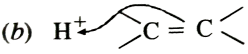
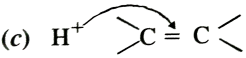
15. The addition of HCl to an alkene proceeds in two steps. The first step is the attack of H^+ ion $C = C$ portion which can be shown as

A. 

B. 

C. 

D. All of these are possible

Answer: B

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16. Which of the following compounds contain all the carbon atoms in the same hybrisation state ?

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

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

C. $CH_2 = C = CH_2$

D. $CH_2 = CH - CH = CH_2$

Answer: A::D

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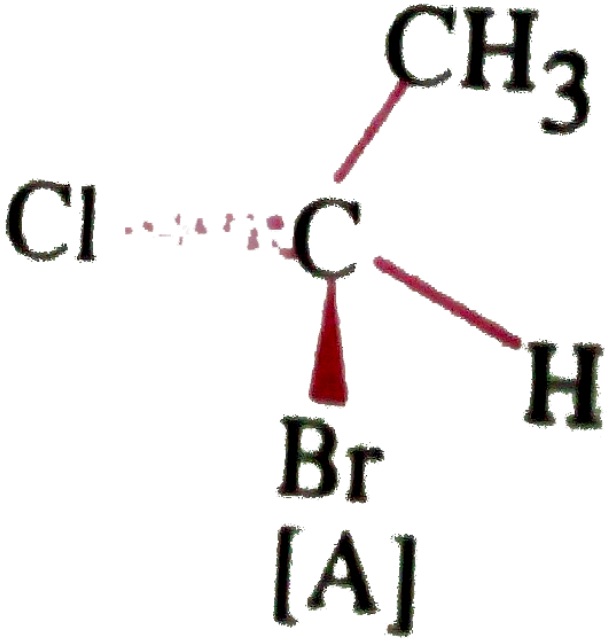
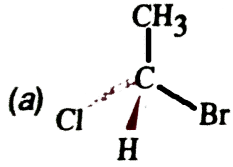
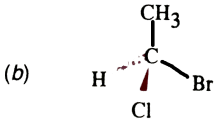
17. In which of the following representations given below spatial arrangement of group/atom is different from that given in structure 'A' ?

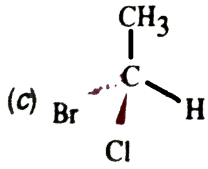




A.

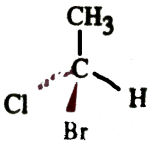


B.



C.

D. (d)



Answer: A::C::D

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18. Electrophilies are electron seeking species. Which of the following groups contain only electrophiles ?

A. BF_3, NH_3, H_2O

B. $AlCl_3, SO_3, NO_2^+$

C. $NO_2^+, CH_3^+, CH_3 - \overset{+}{C} = O$

D. $C_2H_5^-, \dot{C}_2H_5, C_2H_5^+$

Answer: B::C

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19. Which of the following pairs are positive isomers ?

A. I and II

B. II and III

C. II and IV

D. III and IV

Answer: B

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20. Which of the following pairs are not functional group isomers ?

A. II and III

B. II and IV

C. I and IV

D. I and II

Answer: A::C

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21. Nucleophile is a species that should have

A. a pair of electrons to donate

B. positive charge

C. negative charge

D. electron deficient nature

Answer: A::C

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22. Hyperconjugation involves delocalization of

A. electrons of carbon-hydrogen σ bond of an alkyl group directly attached to an atom of unsaturated system.

B. electrons of carbon-hydrogen σ bond of alkyl group directly attached to the positively charged carbon atom.

C. π-electrons of carbon-carbon bond

D. lone pair of electrons

Answer: A::B

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Matching Type

1. Match the type of mixture of compounds in Column I with the technique of separation/purification given in Column II.

Column I		Column II
(a)	Two solids which have different solubilities in a solvent and which do not undergo reaction when dissolved in it.	(i) Steam distillation
(b)	Liquid that decomposes at its boiling point	(ii) Fractional distillation
(c)	Steam volatile liquid	(iii) Simple distillation
(d)	Two liquids which have boiling points close to each other	(iv) Distillation under reduced pressure
(e)	Two liquids with large difference in boiling points.	(v) Crystallisation

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2. Match the terms mentioned in Column I with terms in Column II.

	Column I		Column II
(a)	carbocation	(i)	Cyclohexane and hex-1-ene
(b)	Nucleophile	(ii)	Conjugation of electrons of C - H σ bond
(c)	Hyperconjugation	(iii)	Sp^2 hybridised carbon with empty p-orbit
(d)	Isomers	(iv)	Ethyne
(e)	sp hybridisation	(v)	Species that can receive a pair of electrons
(f)	Electrophile	(vi)	Species that can supply a pair of electrons

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3. Match Column I with Column II.

Column I	Column II
(a) Dumas method	(i) $AgNO_3$
(b) Kjeldahl's method	(ii) Silica gel
(c) Carius method	(iii) Nitrogen gas
(d) Chromatography	(iv) Free radicals
(e) Homolysis	(v) Ammonium sulphate

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4. Match the intermediates given in Column I with their probable structure in Column II

	Column I		Column II
A.	Free radical	1.	Trigonal planar
B.	Carbocation	2.	Pyramidal
C	Carbanion	3.	Linear

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5. Match the ions given in column 1 with their nature given in Column II.

Column I	Column II
(*a*) $CH_3-\ddot{O}-\overset{\oplus}{C}H-CH_3$	(*i*) Stable due to resonance
(*b*) $F_3C^{\oplus}$	(*ii*) Destabilised due to inductive effect
(*c*) $CH_3-\underset{CH_3}{\overset{CH_3}{\overset{\ominus}{C}}}$	(*iii*) Stabilised by hyperconjugation
(*d*) $CH_3-\overset{\oplus}{C}-CH_3$	(*iv*) A secondary carbocation

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Assertion Reason

1. Assertion (A) : Simple distillation can help in separating a mixture of propan-1-ol (boling point $97^{\circ}C$) and propanone (boiling point $56^{\circ}C$).

Reason (R) : Liquids with a difference of more than $20^{\circ}C$ in their boiling points can be separated by simple distillation.

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: A::B

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2. Assertion (A) : Energy of resonance hybrid is equal to the average of energies of all canonial forms.

Reason (R) : Resonance hybrid cannot be presented by a single structure.

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: D

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3. Assertion (A) : Pent-1-ene and pent-2-ene are position isomers.

Reason (R) : Position isomers differ in the position of functional group or a substituent.

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: A

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4. Assertion (A) : All the carbon atoms in $H_2C = C = CH_2$ are sp^2 hybridised

Reason (R) : In this molecule, all the carbon atoms are attached to each other by double bonds.

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: D

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5. Assertion (A) : Sulphur present in an organic compound can be estimated quantitatively bu Carius method.

Reason (R) : Sulphur is separated easily from other atoms in the molecule and hets precipitated as light yellow solid.

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: C

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6. Assertion (A) : Compounds of a mixture of red and blue inks can be separated by distributing the compounds between stationary and mobile phases in paper chromatography.

Reason (R) : The coloured components of inks migrate at different rates

because paper selectively retains different components according to the difference in their partition between the two phases.

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: A

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7. Assertion : But-1-ene and 2-methylprop-1-ene are position isomers.

Reason : Position isomers have same molecular formula but different arrangement of carbon atoms.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: D

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8. Assertion : All the carbon atoms of but-2-ene lie in one plane.

Reason : All the carbon atoms in but-2-ene are sp^2 hybridized.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: C

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9. Assertion : Alkenes having more than three carbon atoms exhibit chain isomerism.

Reason : All carbon atoms in alkanes are sp-hybridized.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: C

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10. Assertion : In $CH_2 = C = CH_2$, all the carbon atoms are sp^2-hybridized.

Reason : All the hydrogen atoms lie in one plane.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: D

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11. Assertion : Butane and 2-methylbutane are homologues.

Reason : Butane is a straight chain alkene while 2-methylbutane is a branched chain alkene.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: B

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12. Assertion : Tertiary carbocations are generally formed more easily than primary carbocations.

Reason : Hyperconjugation as well as inductive effect due to additional alkyl groups stabilize tertiary carbocations.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: A

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13. Assertion : Alkyl carbanions like ammonia have pyramidal shape.

Reason : The carbon atom carrying negative charge has an octet of electrons.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: B

View Text Solution

14. Assertion : Carbocation are planar in nature.

Reason : Carbocations are sp^2 hybridised.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: A

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15. Assertion : IUPAC name of compound $CH_3CH = CH - CHO$ is but-2-enal.

Reason : Functional group gets preference over multiple bond in the IUPAC name of a compound.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: A

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16. Assertion : Compounds with difference in their boiling points by about $30^{\circ} C$ can be separated by simple distillation.

Reason : All liquid mixtures can be separated by distillation method.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: C

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17. Assertion : Heterolytic fission occurs readily in polar covalent bonds.

Reason : Heterolytic fission involves the breaking of bonf in such a way that the shared pair of electrons goes with one atom.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If both assertion and reason are incorrect.

Answer: B

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Mcqs

1. Sublimation is a process in which a solid :

A. changes into another allotropic form

B. changes into liquid form

C. changes into vapour form

D. None of the above

Answer: C

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2. Naphthalene is a volatile solid. It is best purified by :

A. crystallisation

B. distillation

C. steam distillation

D. sublimation

Answer: D

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3. Methyl alcohol and acetone can be separated by :

A. fractional distillation

B. distillation

C. steam distillation

D. vacuum distillation.

Answer: A

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4. Separation of two substances by fractional crystallisation depends upon their differences in:

A. densities

B. volatility

C. solubility

D. crystal shape.

Answer: C

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5. Aniline is separated from a liquid maxture containing non-volatile impurity by :

A. fractional crystallisation

B. fractional distillation

C. vacuum distillation

D. steam distillation

Answer: D

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6. Glycerol is purified by:

A. steam distillation

B. vacuum distillation

C. sublimation

D. simple distillation.

Answer: B

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7. Two immiscible liquids are separated by:

A. separating funnel

B. fractional distillation

C. chromatography

D. sublimation

Answer: A

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8. Steam distillation is applied to those organic compounds which are steam volatile and:

A. soluble in water

B. insoluble in water

C. sparingly soluble in water

D. insoluble in all solvents

Answer: B

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9. There are several criteria for purity of organic compounds. Out of these which one is considered best?

A. Melting point

B. Microscopic examination

C. Mixed melting point

D. colour.

Answer: B

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10. In paper chromatography:

A. the moving phase is a liquid and stationary phase is a solid

B. the moving phase is a solid and stationary phase is a liquid

C. both the phases are liquids

D. both the phases are solids.

Answer: C

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11. Chromatography technique is used for the separation of :

A. small samples of mixtures

B. plant pigments

C. dye stuffs

D. All the above.

Answer: D

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12. A mixture of naphthalene and oxalic acid can be separated by :

A. chromatography

B. sublimation

C. fractional crystallisation

D. distillation.

Answer: B

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Assignment

1. Name the first organic compound to be prepared in the laboratory.

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2. What is the self linking property of an atom known as ?

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3. Give the types of the carbocylic compounds.

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4. Can $-NO_2$ group act as secondary suffix ?

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5. In what respect, the two successive members of a homologous series differ ?

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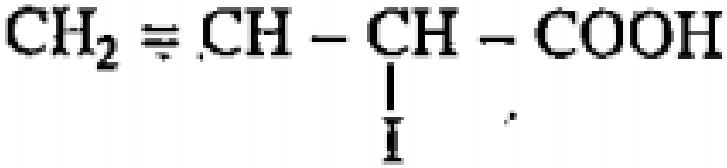
6. Write IUPAC name of an organic compound.



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7. Write the structural formula of isobutyl alcohol.

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8. what secondary suffix represents ketone ?

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9. The formula of hydrocarbon is C_4H_6 ? To which family does it belong ?

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10. Which akyl groups can originate from propane ?

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11. Write the structure of isobutylene ?

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12. Out of $-CHO$ and $>C=O$, which is preferred as a principal functional group ?

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13. The IUPAC name of the compound $CH_2=CH-CH(CH_3)_2$ is

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14. Give the IUPAC name of the hydrocarbon represented by Swastik sign.

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15. Represent but-2-ene by bond line notation.

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16. What is meant by L.P.G. ?

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17. Define a functional group.

Watch Video Solution

18. Which heteroatom is present in pyrrole ?

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19. Pick out the error and write correct IUPAC name of pent-3-yne.

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20. What are open chain compounds ? Give two examples.

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21. Both ethene and ethyne are unsaturated hydrocarbons. Explain on the basis of concept of hybridisation.

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22. Give the IUPAC names of the following :

(i) $CH_3 - CH = CH - CH = CH_2$

(ii) $CH_3 - CH_2 - CHO$

(iii) $CH - \overset{\overset{O}{||}}{C} - CH_2 - CH_3$

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23. How is an alkyl group represented ? Give the structures and the names of the alkyl agroups which originate from (i) n-butane (ii) isobutane.

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24. Giev the IUPAC names of :

(i) $\begin{array}{l} CH_3 - CH - C - CH - CH_3 \\ \quad\quad\quad | \quad\quad || \quad\quad | \\ \quad\quad\quad Br \quad\quad O \quad\quad CH_3 \end{array}$

(ii) $\begin{array}{l} CH_3 - CH - C - CH - CH_3 \\ \quad\quad\quad | \quad\quad || \quad\quad | \\ \quad\quad\quad NO_2 \quad\quad O \quad\quad CH_3 \end{array}$

(iii) $(CH_3)_3C - CH_2 - CH_2 - Cl$

(iv) $\begin{array}{l} CH_3 - CH - CH_2 - CH_3 \\ \quad\quad\quad | \\ \quad\quad\quad Br \end{array}$

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25. Write the structures of the following :

(i) Acetone (ii) Ethylene glycol

(iii) Sec-butyl alcohol.

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26. Give the structures of the following aromatic compounds:

(i) p-Toluidine (ii) p-cresol

(iii) T.N.T. (iv) Benzophenone.

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27. Write the structures of the following compounds :

(i) But-2-enoic acid

(ii) But-1-en-3-yne

(iii) 3, 4, 4-Trimethylhex-1-yne

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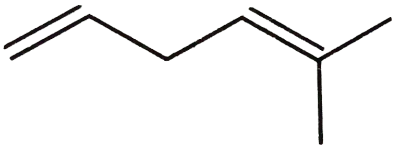
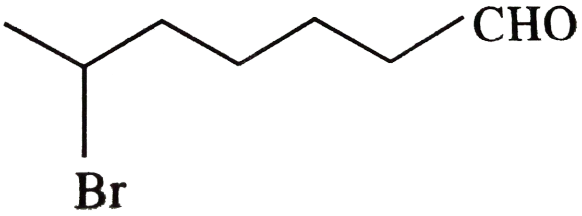
28. Write the IUPAC names of the following :

(i)



(ii)

(iii)



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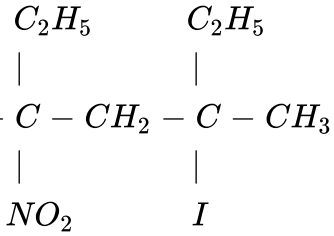
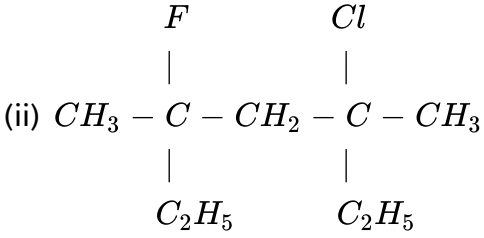
29. Write the IUPAC names of the following :

(i)



(ii) 

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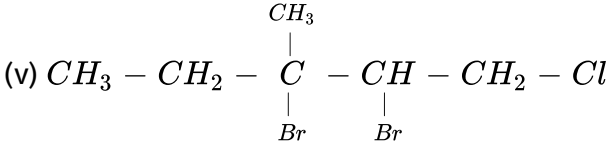
30. Write the IUPAC names of the following compounds :

(i) $C_6H_5CH_2CH_2OH$ (ii) $(CH_3)_2CHC \equiv CH$

(iii) $(CH_3)_2CHCH_2CHO$

(iv) $BrCH_2CH_2CH_2Cl$

(v) 

(vi) $CH_2 = CH - C \equiv N$

(vii) $CH_3CH = CHCH_2NH_2$

(viii) $CH_3CH = CHCOOH$

(ix) $CH_3O - CH(CH_3)_2$

(x) $(C_2H_5)_2CH.CH_2OH$

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31. Write the compounds formula and IUPAC names of the following compounds known by their common names :

(i) Neopentane (ii) Vinyl chloride

(iii) Glycerol (iv) Tert-amyl alcohol.

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32. Write the structures of the following :

(i) But-2-en-1-ol

(ii) 2-Aminoethan-1-ol

(iii) 2, 4-Dimethylhexan-3-one

(iv) 1, 3-Diaminopropane

(v) 4-Ethyl-2, 4-dimethylhexane

(vi) 5-(1, 2-Dimethylpropyl) nonane.

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33. Which of the following represented the correct IUPAC names for the compounds concerned ?

(a) 2, 2-Dichloropentane or 2-Dichloropentane

(b) 2, 3-Dimethylpentane or 3, 4-Dimethylpentane

(c) 2-Bromo-4-methylpentane or

4-Bromo-2-methylpentane

(d) But-3-en-1-ol or But-4-ol-1-ene.

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34. Write bond line notation formulae for

(i) Tert-butylcyclohexane

(ii) Hexan-3-one

(iii) Isopropyl chloride

(iv) 2-Methylcyclopentanone

(v) 3, 3-Dimethylpentan-2-one

(vi) Cyclobuta-1, 3-diene.

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Some Basic Principles In Organic Chemistry

1. Why is ethyl amine a stronger base than ammonia?

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2. Show how the carbanion $\overset{\ominus}{C}H_2 - \overset{O}{\overset{\|}{C}}H_3$ is stabilised by resonance.

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3. Arrange the following in decresing order of -I effect

$-C_6H_5,\ -NO_2,\ -COOH,\ -CN,\ -I,\ -F,\ -CH_3,\ -C_2H_5$

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4. Why is $-CH_3$ group ortho and para directing in toluene ?

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5. Why is trichloroacetic acid stronger acid than acetic acid?

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6. Classify the following into electrophilies and nucleophiles:

(a) H^+ , (b) NH_3

(c) $AlCl_3$, (d) NO_2^+

(e) CN^- , (f) H_2O

(g) ROH , (h) H_2O

(i) Carbocation.

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7. Arrange the following according to increasing stability:

$\underset{(I)}{CH_3CH_2CH_2\overset{+}{C}H_2}, \underset{(II)}{(CH_3)_3\overset{+}{C}}, \underset{}{CH_3}, \underset{(III)}{CH_3CH_2\overset{+}{C}H_3}$

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8. Arrange the following in increasing order of acidic strength:

$ClCH_2COOH, CH_3CH_2COOH, ClCH_2CH_2COOH, CH_3COOH.$

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9. What is the state of hybridisation of carbocation?

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10. Out of benzyl and ethyl carbocation which is more stable?

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11. What is the effect of introducing an alkyl group on the stability of carbocation?

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12. Whay does benzene behave like a saturated hydrocarbon?

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13. What is the hyper-conjugation? Which is the most stable among the following?

$CH_3\dot{C}H_2, (C\dot{H}_3)_3\dot{C}, (CH_3)_2\dot{C}H$

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14. Out of ethylamine and acetamide which is a stronger base and why?

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15. What is the effect of introducing an alkyl group on the stability of free radical?

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16. What do you understand by resonance ? How does resonance account for :

(i) Stability of benzene

(ii) Acidic character of carboxylic acids ?

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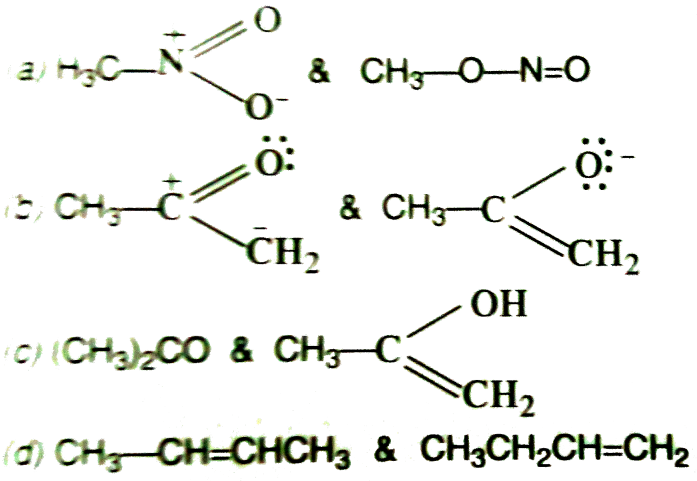
17. Which of the following pairs of structures donot constitute resonating structures ?



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Purification Of Organic Compounds

1. Name two solvents which are commonly used to dissolve organic solids.

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2. Which subtance is used to decolourise a coloured sample of organic compound ?

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3. How will you purify impure naphthalene ?

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4. Under what conditions do we use fractional distillation ?

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5. Suggest a method to separate o-nitrophenol from p-nitrophenol.

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6. How will you purify impure benzene ?

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7. How will test whether a given solid has been purified or not ?

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8. You are provided with a mixture of three components in a very small amount. Suggest a method for their identification.

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9. How will you separate ether from water ?

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10. A liquid non0volatile impurities. How will you obtain pure liquid ?

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11. A liquid compound starts decomposing well before its boiling point under normal pressure. How will you purify it ?

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12. Name the adsorbent commonly in adsorption chromatography.

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13. Suggest a method to purify a mixture of two solids which are soluble in the same solvent.

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14. Impure glycerol decomposes at a temperature below its boling point. How will you purify it ?

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Detection Estimation Of Organic Compounds

1. Write the formula of prussian blue ?

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2. Which elements are normally not detected in an organic compound ?

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3. Is sodium lime test satisfactory for the detection of nitrogen ?

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4. What is the purpose of levelling ?

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5. For which substances kjeldahl's method is not useful ?

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6. What do we notice in Lassaigne's test if the compound contains both nitrogen and sulphur ?

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7. Can we estimate oxygen in a compound ?

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8. Which method is used to estimate carbon and hydrogen ?

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9. What is the basicity of oxialic acid ?

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1. Which of the following is an unsaturated compound ?

A. C_6H_{14}

B. C_4H_8

C. C_3H_7OH

D. CH_3OH

Answer: B

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2. The general formula of an ester where R represents an alkyl group is:

A. ROH

B. RCOOH

C. RCOOR

D. RH

Answer: C

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3. The IUPAC name of CH_3CHO is :

A. Acetaldehyde

B. Methylaldehyde

C. Formyl chloride

D. Ethanal

Answer: D

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4. The IUPAC name of the compound $CH_2 = CH - CH(CH_3)_2$ is:

A. 1, 1-Dimethylprop -2-ene

B. 3-Methylbut-1-ene

C. 2-Vinylpropane

D. 1-Isopropylethylene

Answer: B

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5. Which of the following statements is wrong?

A. Covalent compounds are generally soluble in polar solvents

B. Covalent compounds have low melting and boiling points

C. Ionic solids donot conduct electricity

D. Ionic compounds conduct electricity in the fused state

Answer: A

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6. The IUPAC name for

$$CH_3 - \underset{\underset{OH}{|}}{CH} - CH_2 - \overset{\overset{CH_3}{|}}{\underset{\underset{OH}{|}}{C}} - CH_3$$ is:

A. 1, 1-Dimethylbutane -1, 3-diol

B. 4-Methylpentane-2, 4-diol

C. 2-Methylpentane-2, 4-diol

D. 1, 3, 3-Trimethylpropane-1, 3-diol

Answer: C

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7. The IUPAC name of $CH_3C \equiv CCH(CH_3)_2$ is:

A. 4-Methylpent -2-yne

B. 4, 4-Dimethylbut-2-yne

C. Methyl isopropyl acetylene

D. 2-Methylpent-4-yne

Answer: A

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8. Which of the following molecular formula belongs to alkyne series ?

A. C_7H_{14}

B. $C_{10}H_{22}$

C. C_9H_{16}

D. $C_{16}H_{32}$

Answer: C

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9. Alicyclic compounds are :

A. Aromatic compounds

B. Aliphatic cyclic compounds

C. Heterocyclic compounds

D. None of these

Answer: B

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10. The systematic name of $(CH_3)_2CHCOOH$ is:

A. 2-Propanoic acid

B. Isobutanoic

C. 2-Methylpropanoic acid

D. 2-Methylbutanoic acid

Answer: C

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11. The IUPAC name of $(CH_3)_2CHCH_3$ is

A. Dimethylethane

B. Trimethylmethane

C. Isopropylmethane

D. 2-Methylpropane

Answer: D

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12. On heating, a mixture of potassium cyanate and ammonium chloride gives :

A. Urea

B. Methanamide

C. Ethanamide

D. Ethanamine

Answer: A

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13. The structure of 4-Methylpent -2-en-1-ol is:

A. $CH_3CH_2CH = CHCH_2OH$

B. $(CH_3)_2C = CHCH_2CH_2OH$

C. $(CH_3)_2CHCH = CHCH_2OH$

D. $CH_3CH(OH)CH - CH = C(CH_3)_2$

Answer: C

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14. Which of the following has neither secondary nor tertiary hydrogen ?

A. Isobutane

B. Isopentane

C. Pentane

D. Neopentane

Answer: D

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15. Thermodynamically most stable form of carbon is:

A. Diamond

B. Graphite

C. Peat

D. Coal

Answer: B

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16. Which among the following oxides is neutral ?

A. CO

B. SnO_2

C. ZnO

D. SiO_2

Answer: A

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17. The IUPAC name of $(CH_3)_2CHCH_2CH_2Cl$ is :

A. 1-Chloropentane

B. 1-Chloro-3-methylbutane

C. 2-Methyl-3-chloropropane

D. None

Answer: B

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18. The IUPAC name of $(CH_3)_3C - CH = CH_2$ is :

A. 2, 2-Dimethylbut -3-ene

B. 2, 2-Dimethylpent-4-ene

C. 3, 3-Dimethylbut -1-ene

D. Hex-1-ene

Answer: C

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19. The IUPAC name of compound

$$CH_3 - \underset{\underset{CH_2CH_3}{|}}{CH} - CH_2 - CH(OH) - CH_3$$ is

A. 4-Methylhexan-3-ol

B. Heptan-2-ol

C. 4-Methylhexan-2-ol

D. None of these

Answer: C

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20. In graphite, electrons are :

A. localised on every third carbon

B. present in antibonding orbital

C. localised on each carbon

D. spread out between the structures

Answer: D

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21. What is the IUPAC name of

$$H-\overset{\overset{O}{||}}{C}-CH_2-CH_2-OCH_3?$$

A. 2-Formylmethoxyethane

B. Methoxypropanal

C. 2-Methoxpropanal

D. 3-Methoxypropanal

Answer: D

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22. The IUPAC name of:

$$CH_3 - \underset{\underset{Cl}{|}}{C} = \underset{\underset{CH_3}{|}}{C} - - \underset{\underset{C_2H_5}{|}}{CH} - CH_2C \equiv CH$$ is

A. 6-Chloro-4-ethyl-5-methylhept-5-en-1-yne

B. 6-Chloro-4-ethyl-5-methylhept-1-yn-5-ene

C. 2-Chloro-4-ethyl-3-methylhept-2-ene-6-yne

D. 2-Chloro-4-ethyl-3-methylhept-6-yn-2-ene

Answer: A

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23. The correct IUPAC name of the compound with molecular formula $(CH_3)_3C - CH_3$ is :

A. Pentane

B. 1, 1, 1-Trimethylthane

C. 2, 2-Dimethylpropane

D. Neopentane

Answer: C

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24. The IUPAC name for the fomula:

$CH_3 - \overset{CH_3}{\overset{|}{C}} = CH - COOH$ is

A. 2-Methylbut-2-enoic acid

B. 3-Methylbut-3-enoic acid

C. 3-Methylbut-2-enoic acid

D. 2-Methylbut-3-enoic acid

Answer: C

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25. Carbogen is :

A. Pure form of carbon

B. $COCl_2$

C. mixture of CO and CO_2

D. mixture of O_2 and CO_2

Answer: D

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26. Which of the following does not show electrical conduction ?

A. Potassium

B. Graphite

C. Diamond

D. Sodium

Answer: C

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27. Percentage of lead in lead pencil is :

A. Zero

B. 20

C. 80

D. 70

Answer: A

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28. The IUPAC name for $CH_3CH_2CH(CH=CH_2)CH_2CH_2CH_3$ is

A. 4-Ethenylheptane

B. 3-n-propylhex-1-ene

C. 3-Ethenylheptane

D. None of these

Answer: B

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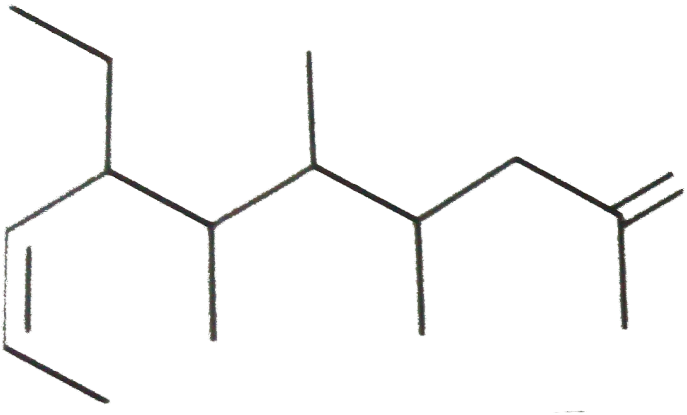
29. The IUPAC name of compound



A. 4-Ethyl-5, 6, 7, 9-tetramethyldeca-2, 9-diene

B. 7-Ethyl-2, 4, 5, 6-tetramethyldeca-1, 8-diene

C. 7-Ethyl-2, 4, 5, 6-tetramethyldeca-1, 7-diene

D. 7-(1-Propenyl)-2, 3, 4, 5-tetramethylnon-1-ene

Answer: B

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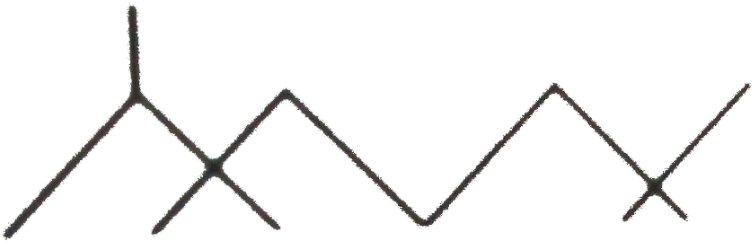
30. The IUPAC name of alkane



A. 2, 2, 6, 6, 7-Pentamethylocatne

B. 2, 3, 3, 7, 7-Pentamethyloctane

C. 5-tertiarybutyl-2-isopropyl-2-methylpentane

D. 2-isopropyl-2, 6, 6-trimethylheptane

Answer: A

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31. Which of the following series contains only electrophiles

A. H_2O, SO_3, H_3O^+

B. NH_3, H_2O, $AlCl_3$

C. $AlCl_3$, SO_3, NO_2^+

D. H_2O, Cl^+, NH_3

Answer: C

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32. The IUPAC name for the formula

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

A. 2-Methylbut-2-enoic acid

B. 3-Methylbut-3-enoic acid

C. 3-Methylbut-2-enoic acid

D. 2-Methylbut-3-enoic acid

Answer: C

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33. The IUPAC name of

$$CH_3 - \overset{\overset{O}{||}}{C} - CH_2 - \overset{\overset{OH}{|}}{CH} - CHO$$ is

A. 5-Oxo-4-hydoxypentan-2-one

B. 4-Hydroxy-5-al-2-pentanone

C. 2-Hydroxy-4-oxopentanal

D. 1-al-4-oxo-pentan-2-ol

Answer: C

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34. The IUPAC name of the following compound will be

$$CH_3 - \overset{\overset{O}{||}}{C} - CH_2 - \overset{\overset{OH}{|}}{C}H - CHO$$ is

A. 3-Propylhex-3-ene

B. 3-Propylhex-2-ene

C. 3-Ethylhex-2-ene

D. 4-Ethylhex-4-ene

Answer: C

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35. The IUPAC name of compound

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

A. 5-Oxo-4-hydoxypentan-2-one

B. 4-Hydroxy-2-methypentanal

C. 2-Hydroxy-4-methylpentanal

D. 2-Hydroxy-2-methylpentanal

Answer: B

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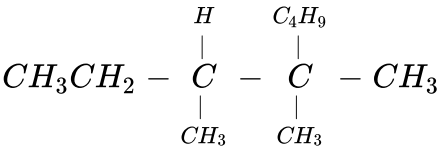
36. The IUPAC name of following compound is:



A. 3, 4, 4-Trimethylheptane

B. 3, 4, 4-Trimethyloctane

C. 2-Butyl-2-methyl-3-ethylbutane

D. 2-Ethyl-3, 3-dimethylheptane

Answer: B

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37. The IUPAC name of tertiary butyl chloride is

A. 4-chlorobutane

B. 2-chlorobutane

C. 1-chloro-3-methylpropane

D. 2-chloro-2-methylpropane

Answer: D

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38. The IUPAC name of acryaldehyde is

A. prop-2-enal

B. Propenylaldehyde

C. But-2-enal

D. Propenal

Answer: A

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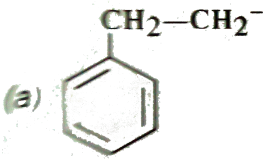
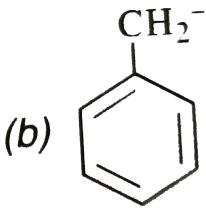
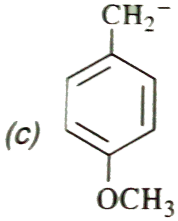
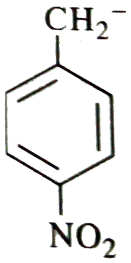
39. Most stable carbanion among the following is

A. 

B. 

C. 

D. (d) 

Answer: D

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40. The addition of carbonyl compound to HCN is an example of

A. Nucleophilic substitution

B. Electrophilic addition

C. Nucleophilic addition

D. Electrohilic substitution

Answer: C

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41. Nucleophilicity order is correct represented by

A. $CH_3^- < NH_2^- < HO^- < F^-$

B. $CH_3^- \cong NH_2^- > HO^- \cong F^-$

C. $CH_3^- > NH_2^- > NO^- > F^-$

D. $NH_2^- > F^- > HO^- > CH_3^-$.

Answer: C

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42. In which of the following homolytic bond fission takes place ?

A. Alkaline hydrolysis of ethyl chloride

B. Addition of HBr to double bond

C. Photochlorination of methane

D. Nitration of benzene.

Answer: C

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43. The incorrect IUPAC name is

A. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{O}{||}}{C}} - CH - CH_3$: 2-Methyl-3-butanone

B. $CH_3 - \underset{\underset{CH_3}{|}}{CH} - \underset{\underset{CH_2 - CH_3}{|}}{CH} - CH_3$: 2, 3-Dimethylpentane

C. $CH_3 - C \equiv C - CH(CH_3)_2$: 4-Methylpent-2-yne

D. $CH_3 - \underset{\underset{Cl}{|}}{CH} - \underset{\underset{Br}{|}}{CH} - CH_3$: 2-Bromo-3-chlorobutane.

Answer: A

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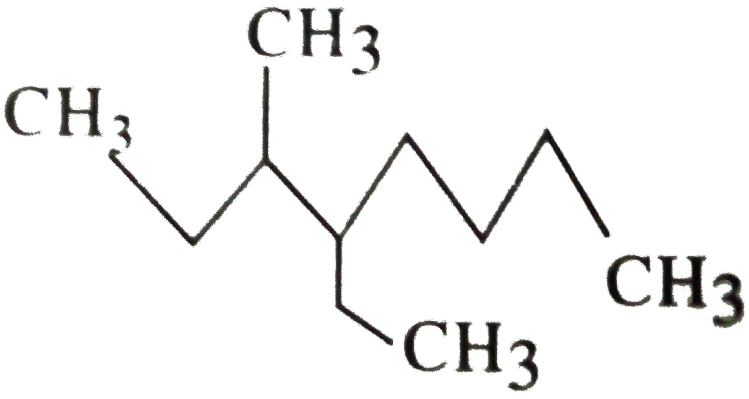
44. The correct IUPAC name of the compound give below is : ltbr.



A. 4-Ethyl-3-methyloctane

B. 3-Methyl-4-ethyloctange

C. 2, 3-Dimethylheptane

D. 5-Ethyl-6-methyloctane

Answer: A

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45. The IUPAC name of $CH_3COCH(CH_3)_2$ is :

A. 4-Methyl isopropyl ketone

B. 3-Methylbutan-2-one

C. Isopropylmethyl ketone

D. 2-Methylbutan-3-one

Answer: B

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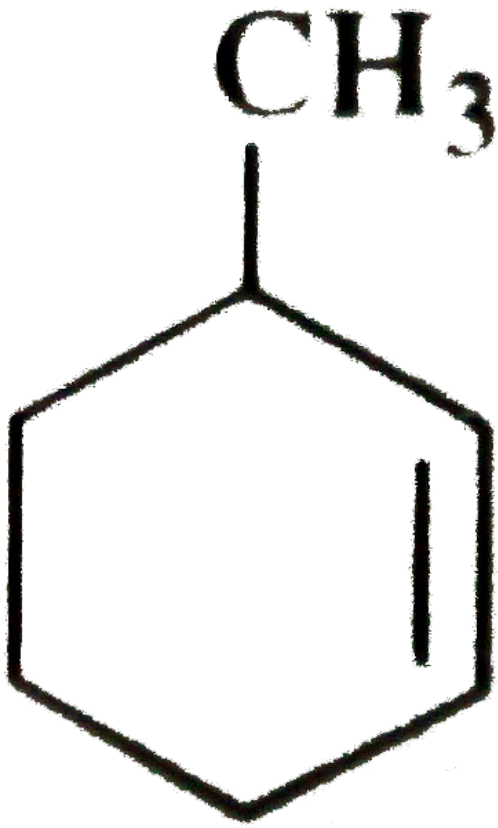
46. The IUPAC name of



is :

A. 3-Methylcyclohexene

B. 1-Methylcyclohex-2-ene

C. 6-Methylcyclohexene

D. 1-Methylcyclohex-5-ene

Answer: A

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47. The most reactive nucleophile among the following is :

A. CH_3O^-

B. $C_6H_5O^-$

C. $(CH_3)_2CHO^-$

D. $(CH_3)_3CO^-$

Answer: D

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48. How many methyl groups are present in 2, 5-Dimethyl-4-ethylnonane ?

A. 2

B. 3

C. 4

D. 5

Answer: C

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49. IUPAC name of

$CH_2 = CH - CH(CH_3CH_2)\underset{\underset{Br}{|}}{C} = CH_2$ is :

A. 4-Bromo-3-ethyl-1, 4-pentadiene

B. 2-Bromo-3-ethyl-1, 4-pentadiene

C. 2-Bromo-3-ethyl-1, 5-pentadiene

D. none of these

Answer: B

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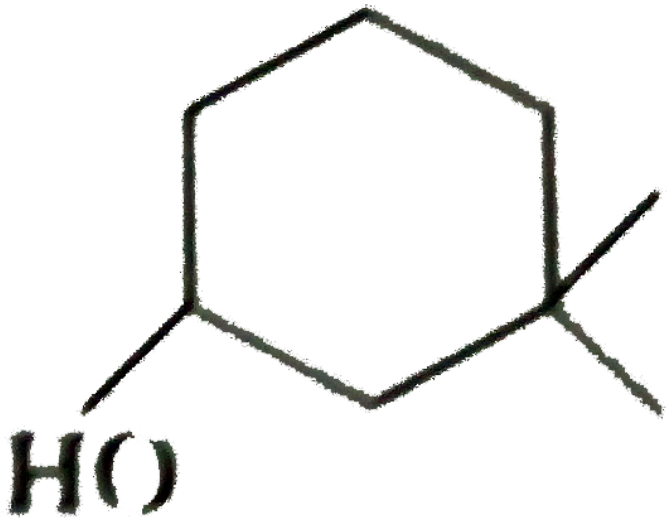
50. The IUPAC name of



is

A. 3, 3-Dimethyl-1-hydroxycyclohexane

B. 1, 1-Dimethyl-3-hydroxycyclohexane

C. 3, 3-Dimethyl-1-cyclohexanol

D. 1, 1-Dimethyl-3-cyclohexanol

Answer: C

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51. IUPAC name of $(CH_3CH_2CO)_2O$ is

A. Prorionic anhydride

B. Dipropanoic anhydride

C. Ethoxypropanoic acid

D. Propanoic anhydride.

Answer: D

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52. The IUPAC name of the compound $CH_3COCH(CH_3)_2$ is :

A. Isopropyl methyl ketone

B. 2-Methylbutane-3-one

C. 4-Methylisopropyl ketone

D. 3-Methylbutane-2-one.

Answer: D

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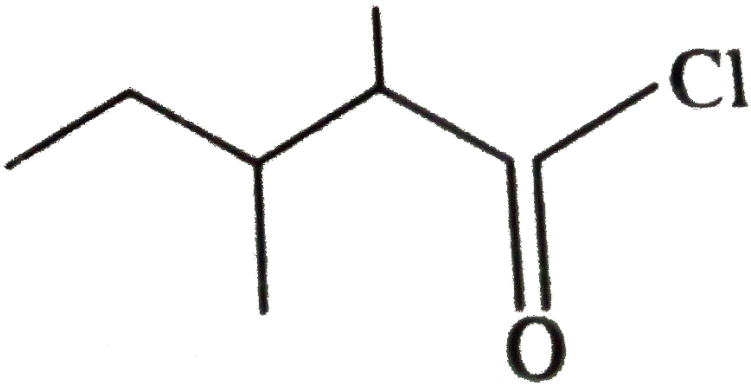
53. The IUPAC name of



is :

A. 2, 3-Dimethylbutanoyl chloride

B. 3, 4-Dimethylpentanoyl chloride

C. 1-Chloro-1-oxo-2, 3-dimethylpentane

D. 2-Ethyl-3-methylbutanoyl chloride.

Answer: A

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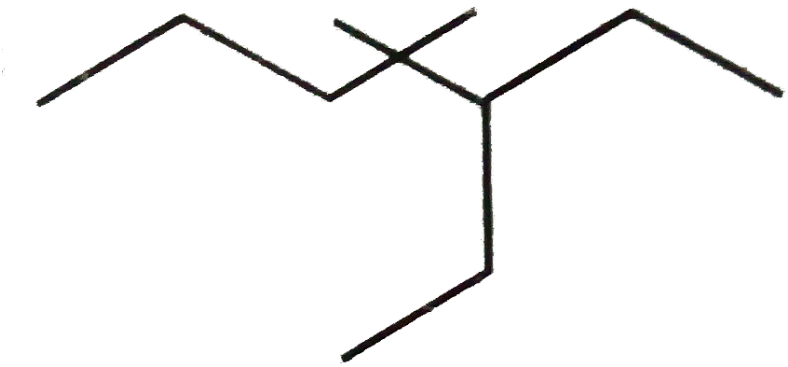
54. The IUPAC name of



is

A. 3-Ethyl-4, 4-dimethylheptane

B. 1, 1-Diethyl-2, 2-dimethylpentane

C. 4, 4-Dimethy-5, 5-dimethylpentane

D. 5, 5-Diethyl-4, 4-Dimethylpentane

Answer: A

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55. The correct decreasing order for the function groups of organic compounds in the IUPAC system of nomenclature is

A. $-CONH_2,\ -CHO,\ -SO_3H,\ -COOH$

B. $-COOH,\ -SO_3H,\ -CONH_2,\ -CHO$

C. $-SO_3H,\ -COOH,\ -CONH_2,\ -CHO$

D. $-CHO,\ -COOH,\ -SO_3H,\ -CONH_2.$

Answer: B

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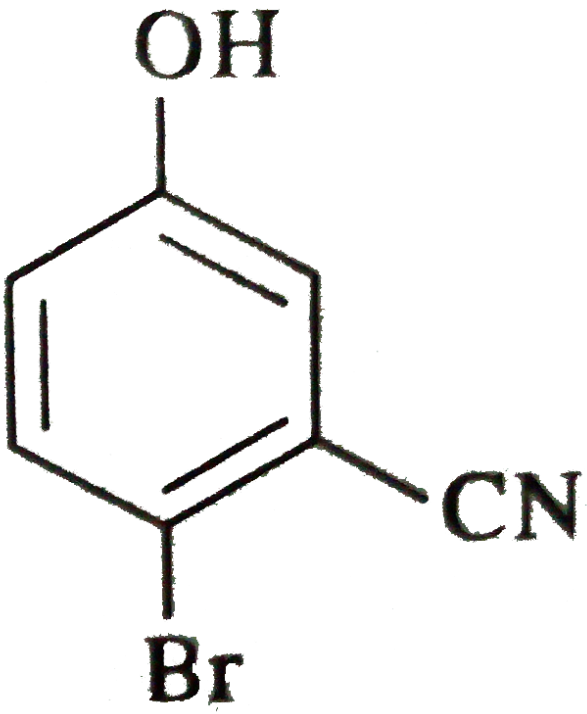
56. The IUAPC name of the following compound is



A. 4-Bromo-3-cyanophenol

B. 2-Bromo-3-hydroxybromobenzene

C. 2-Cyano-4-hydroxybromobenzene

D. 6-Bromo-3-hydrocybenzonitrile.

Answer: B

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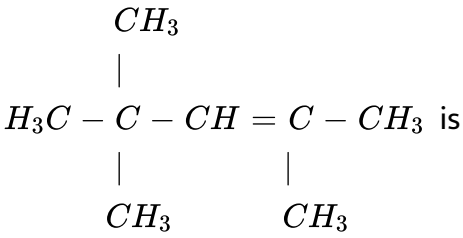
57. IUPAC name of compound



A. 2, 2, 4-Trimethylpent -2-ene

B. 2, 4, 4-Trimethylpent-2-ene

C. 2, 2, 4-Trimethylpent-3-ene

D. 2, 2, 4-Trimethylpent-1-ene

Answer: B

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58. Hyper conjugation is most useful for stabilising which of the following carbocations ?

A. Neo-pentyl

B. Tert-butyl

C. Iso-propyl

D. Ethyl

Answer: B

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59. Which is a correct name according to IUPAC system ?

A. 2, 3-Dimethylhexane

B. 3-Ethyl-2-methylpentane

C. 3, 4-Dimethylpentane

D. 2-Ethyl-2-methylpentane.

Answer: B

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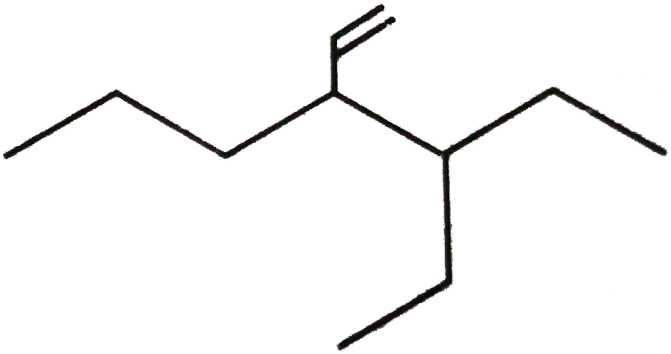
60. The correct IUPAC name of the compound is :



A. 4-Ethyl-3-propylhex-1-ene

B. 3-Ethyl-4-ethenylheptane

C. 3-Ethyl-4-propylhex-5-ene

D. 3-(1-enthypropyl) hex-1-ene.

Answer: A

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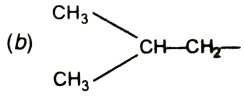
61. The structure of isobutyl group in an organic compound is :

A. $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} -$

B. (b) 

C. $CH_3 - \overset{\displaystyle CH_3}{\overset{|}{CH}} - CH_2 - CH_3$

D. $CH_3 - CH_2 - CH_2 - CH_2 -$

Answer: B

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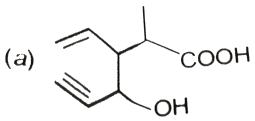
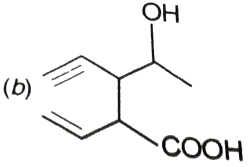
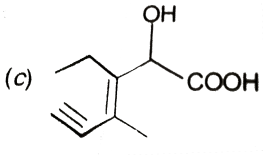
62. Structure of the compound whose $IUPAC$ name is $3-$ ethyl$-2-$ hydroxy$-4-$ methylhex$-3-$ en$-5-$ ynoic acid is

A. (a) 

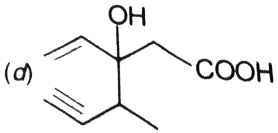
B.



C.



D.



Answer: C

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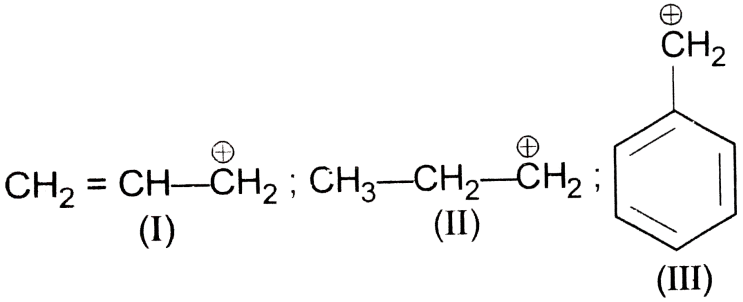
63. The order of the stability of the following of acrbocations is :



A. $III > I > II$

B. $III > II > I$

C. $II > III > I$

D. $I > II > III$

Answer: A

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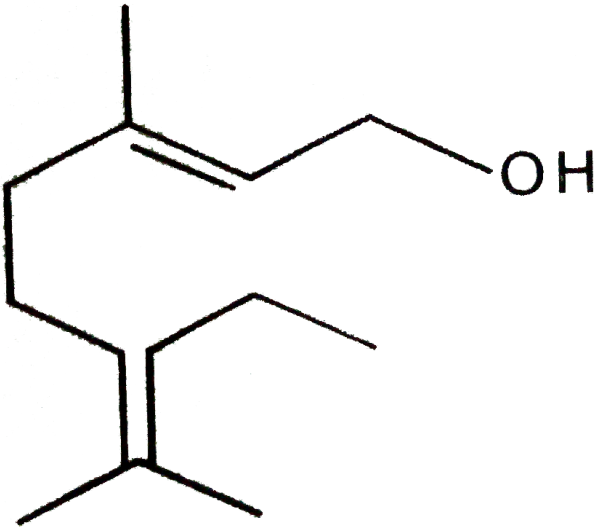
64. The IUPAC name of the following compound is :



A. 3-ethyl-2, 6-dimethyloct-2, 6-dien-1-ol

B. 6-ethyl-3-methyl-6-propyloct-2-en-1-ol

C. 6-ethyl-3, 7-dimethyloct-2, 6-dien-1-ol

D. 3-ehtyl-5, 8-dimethyloct-3, 7-dien-1-ol.

Answer: C

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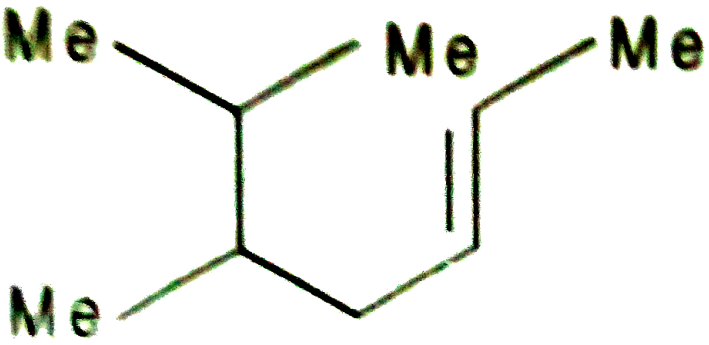
65. The IUPAC name of the following compound is :



A. 5, 6-dimethylhept-2-ene

B. 2, 3-dimethylhept-5-ene

C. 5, 6-dimethylhept-3-ene

D. 5-Isopropylhex-2-ene.

Answer: A

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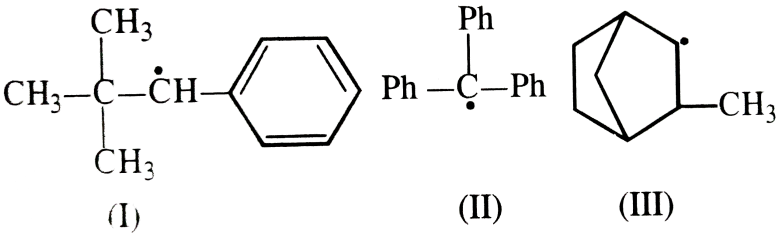
66. Consider the following compounds :



(I) (II) (III)

Hyperconjugation occurs in

A. III only

B. I and III

C. I only

D. II only

Answer: C

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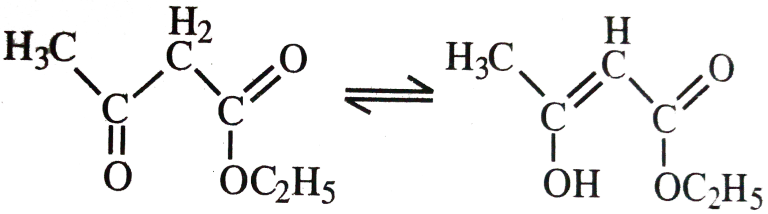
67. The anolic form of ethyl acetoacetate as shown below has



A. 9 sigma bonds and 2 pi-bonds

B. 9 sigma bonds and 1 pi-bond

C. 18 sigma bonds and 2 pi-bonds

D. 16 sigma bonds and 1 pi-bond.

Answer: C

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68. Which of the following statement is not correct for a nucleophile ?

A. Ammonia is a nuclrophile

B. Nucleophiles attack low e^- density sites

C. Nuclophiles are not electron seeking

D. Nucleophile is a Lewis acid.

Answer: D

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69. The resonance effect is defined as 'the polarity produced in the molecule by the interaction of two π-bonds or between a π-bond and lone pair of electrons present on an adjacentatom.' The effect is transmitted through the chain.

In positive resonance effect, the transfer of electrons is away from an atom or substituent group attached to the conjugated system. This electron displacement makes certain positions in the molecule of high

electron densities. In negative resonance effect, the transfer of electrons is towards the atom or substituent group attached to the conjugated system.

Which of the following does not show resonance effect ?

A. Buta-1, 3-diene

B. Acrylonitrile

C. Nitrobenzene

D. Isopropylisothiocyanate

Answer: D

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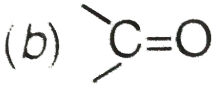
70. The resonance effect is defined as 'the polarity produced in the molecule by the interaction of two π-bonds or between a π-bond and lone pair of electrons present on an adjacentatom.' The effect is transmitted through the chain.

In positive resonance effect, the transfer of electrons is away from an

atom or substituent group attached to the conjugated system. This electron displacement makes certain positions in the molecule of high electron densities. In negative resonance effect, the transfer of electrons is towards the atom or substituent group attached to the conjugated system.

Which of the following shows +M effect ?

A. $-N(CH_3)_2$

B. 

C. $-CN$

D. Both (a) and (c)

Answer: A

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71. The resonance effect is defined as 'the polarity produced in the molecule by the interaction of two π-bonds or between a π-bond and

lone pair of electrons present on an adjacentatom.' The effect is transmitted through the chain.

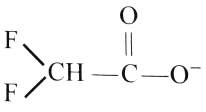
In positive resonance effect, the transfer of electrons is away from an atom or substituent group attached to the conjugated system. This electron displacement makes certain positions in the molecule of high electron densities. In negative resonance effect, the transfer of electrons is towards the atom or substituent group attached to the conjugated system.

Which of the following carboxylate ions is the most stable ?

A. $CH_3 - \overset{O}{\overset{||}{C}} - O^-$

B. $Cl - CH_2 - \overset{O}{\overset{||}{C}} - O^-$

C. $I - CH_2 - \overset{O}{\overset{||}{C}} - O^-$

D. 

Answer: D

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72. The resonance effect is defined as 'the polarity produced in the molecule by the interaction of two π-bonds or between a π-bond and lone pair of electrons present on an adjacentatom.' The effect is transmitted through the chain.

In positive resonance effect, the transfer of electrons is away from an atom or substituent group attached to the conjugated system. This electron displacement makes certain positions in the molecule of high electron densities. In negative resonance effect, the transfer of electrons is towards the atom or substituent group attached to the conjugated system.

The correct statement regarding a carbonyl compound with a hydrogen atom on its alpha carbon, is

A. a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation

B. a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism

C. a carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol

D. a carbonyl compound with a hydrogen atom on its alpha-carbon radidly equilibrates with its corresponding enol and this process is known as aldehyde-ketone equilibration.

Answer: B

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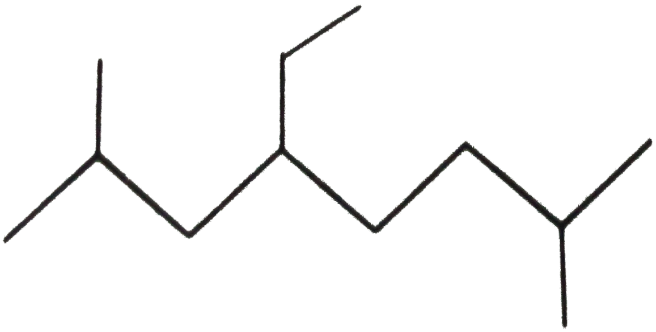
73. The resonance effect is defined as 'the polarity produced in the molecule by the interaction of two π-bonds or between a π-bond and lone pair of electrons present on an adjacentatom.' The effect is transmitted through the chain.

In positive resonance effect, the transfer of electrons is away from an atom or substituent group attached to the conjugated system. This electron displacement makes certain positions in the molecule of high electron densities. In negative resonance effect, the transfer of electrons is towards the atom or substituent group attached to the conjugated system.

What is the IUPAC name for :



A. 5-isobutyl-2-methylheptane

B. 4-ethyl-2, 7-dimethylocatne

C. 5- ehtyl-2, 7-dimethyloctane

D. 2-methyl-5-(2-methylpropyl) heptane.

Answer: B

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74. The resonance effect is defined as 'the polarity produced in the molecule by the interaction of two π-bonds or between a π-bond and lone pair of electrons present on an adjacentatom.' The effect is transmitted through the chain.

In positive resonance effect, the transfer of electrons is away from an atom or substituent group attached to the conjugated system. This electron displacement makes certain positions in the molecule of high electron densities. In negative resonance effect, the transfer of electrons is towards the atom or substituent group attached to the conjugated system.

Which of the following intermediates is pyramidal in shape ?

A. $H_3C^{\oplus}$

B. $H_2\ddot{C}$

C. $H_3C^{\ominus}$

D. $HC \equiv C^{\ominus}$

Answer: C

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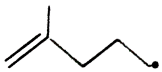
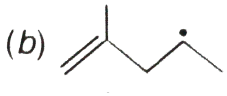
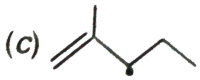
75. The resonance effect is defined as 'the polarity produced in the molecule by the interaction of two π-bonds or between a π-bond and lone pair of electrons present on an adjacentatom.' The effect is transmitted through the chain.

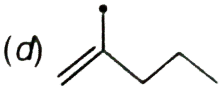
In positive resonance effect, the transfer of electrons is away from an atom or substituent group attached to the conjugated system. This electron displacement makes certain positions in the molecule of high electron densities. In negative resonance effect, the transfer of electrons is towards the atom or substituent group attached to the conjugated system.

Which of the following free radicials is the most stable ?

A. (a) 

B. 

C. 

D. 

Answer: C

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Purification Characterisation Of Organic Compounds

1. A misture of camphor and benzoic acid can be separated by :

A. Sublimation

B. Chemical method

C. Fractional Crystallisation

D. Extractin with solvent

Answer: B

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2. In Kjeldahl's method, nitrogen is estimated as :

A. N_2

B. NH_3

C. NO_2

D. NH_4OH

Answer: B

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3. Two immiscible liquid present in a bottle can be separated by:

A. Separating funnel

B. Steam distillation

C. Fractional distillation

D. Chromatography

Answer: A

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4. In sodium fusion test of organic compounds, the nitrogen in an organic compound is converted inot :

A. Soda lime

B. sodium cyanide

C. Sodium nitrite

D. Sodium nitrate

Answer: B

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5. Which of the following reagents is useful to separate benzoic acid from phenol ?

A. dilute HCl

B. Dilute H_2SO_4

C. 5% $NaOH$

D. 5 % $NaHO_3$

Answer: D

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6. In Duma's method, the gas collected in nitrometer is :

A. N_2

B. NO

C. NH_3

D. H_2

Answer: A

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7. Anthracene is purified by :

A. Filtraction

B. Crystallisation

C. Distillation

D. Sublimation

Answer: D

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8. 0.2 g of an organic compound on complete combustion produces 0.18 g of water. The precentage of hydrogen in it is:

A. 5

B. 10

C. 15

D. 20

Answer: B

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9. Which process is suitable for the purification of aniline ?

A. Simple distillation

B. Steam distillation

C. Fractional distillation

D. Fractional crystallisation

Answer: B

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10. In the Lassaigne's test for the detection of sulphur, the purple colour is due to the formation of

A. $Na_4\left[Fe(CN)_5NOD\right]$

B. $Na_3\left[Fe(CN)_5S\right]$

C. $Na_2\left[Fe(CN)_5NOS\right]$

D. $Na_3\left[Fe(CN)_6\right]$

Answer: A

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11. For which of the following compounds will Lassaigne's test for nitrogen fail ?

A. NH_2CONH_2

B. CH_3CONH_2

C. NH_2NH_2

D. $C_6H_5NH_2$

Answer: C

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12. The most satisfactory method to separate mixture of sugars is :

A. Fractional crystallisation

B. Sublimation

C. Chromatography

D. None of these

Answer: C

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13. Lassaigne's extract is botted with dilute HNO_3 before testing for halogens because :

A. Silver halides are soluble in HNO_3

B. Na_2S and NaCN are decomposed by HNO_3

C. Ag_2S is soluble in HNO_3

D. $AgCN$ is soluble in HNO_3

Answer: B

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14. The purity of an organic solid is determined by :

A. density

B. melting point

C. mixed melting point

D. molecular mass

Answer: C

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15. Absolute alcohol is prepared by :

A. Fractional distillation

B. Kolbe's method

C. Vacuum distillation

D. Azeotropic distillation

Answer: D

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16. 0.32 g of an organic compound gave 0.233 g of $BaSO_4$. Determine the percentage of sulphur in the compound (Atomic mass of $Ba = 137, S = 32, O = 16$)

A. 1.0

B. 10.0

C. 23.5

D. 32.4

Answer: B

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17. Which is not used to purify organic solids ?

A. Distillation

B. Sublimation

C. Crystallisation

D. None of these

Answer: A

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18. Chloroform and benzene form a pair of miscible liquids. These can be separated by:

A. Sublimation

B. Filtration

C. Separating funnel

D. Fractional distillation

Answer: D

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19. During Lassaigne's test S and N present in an organic compound change into :

A. Na_2S and $NaCN$

B. Na_2SO_4 and $NaCN$

C. Na_2S and $NaCNO$

D. $NaCN$ and $NaCNO$

Answer: A

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20. The best method to separate a mixture of ortho and para nitrophenol $(1:1)$ is :

A. Steam distillation

B. Crystallisation

C. vaporisation

D. colour spectrum

Answer: A

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21. Nitrogen in an organic compound can be estimated by :

A. Kjeldahl's method only

B. Duma's method only

C. both these method

D. None of these

Answer: C

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22. If 0.2 g of an organic compound containing carbon, hydrogen and oxygen on combustion yielded 0.147 g of CO_2 and 0.12 g of H_2O. What will be the content of oxygen in the substance ?

A. $73.29\ \%$

B. $78.45\ \%$

C. $83.23\ \%$

D. $89.50\ \%$

Answer: A

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23. A mixture contains four solid organic compounds A, B, C and D. Only heating, only C changes from the solid to the vapour state. The compound C can be separated from the rest by :

A. Distillation

B. Sunlimation

C. Fractional distillation

D. Crystallisation

Answer: B

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24. Molecular mass of a volatile substance is determined by :

A. Kjeldahl's method

B. Duma's method

C. victor Meyer's method

D. Liebig's method

Answer: C

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25. The Beilstein test is used in organic compounds for :

A. Carbon

B. Sulphur

C. Nitrogen

D. Halogens

Answer: D

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26. The best solvent to remove butter stain from cloth is :

A. $CHCl_3$

B. C_2H_5OH

C. $C_2H_5OC_2H_5$

D. H_2O

Answer: A

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27. Which of the following statement is wrong ?

A. Using Beilstein's test, the presence of halogens in a compound can be tested

B. In Lassaigne's filtrate, the nitrogen in an organic compound is converted to $NaCN$.

C. Lassaign's test fail to identify nitrogen in diazo compound

D. In the estimation of carbon, an organic compound is heated with CaO in a combustion tube.

Answer: D

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28. The ammonia evolved from the treatment of 0.30 g of an organic compound for the estimation of nitrogen was passed in 100 mL of 0.1 M sulphuric acid . The excess of acid required 20 mL of 0.5 M NaOH solution for complete neutralisation.The organic compound is

A. acetamide

B. benzamide

C. urea

D. thiourea.

Answer: C

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29. How will you separate a mixture of two miscible liquids benzene and chloroform ?

A. sublimation

B. Filtration

C. Fractional distillation

D. Crystallisation

Answer: C

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30. For the estimation of nitrogen, 1.4 g of an organic compound was digested by Kjeldahl method and the evolved ammonia acid absorbed in 60 mL of $\frac{M}{10}$ sulphuric acid. The unreacted acid required 20 mL of $\frac{M}{10}$ sodium hydroxide for complete neutralization. the percentage of nitrogen in the compound is

A. $5\ \%$

B. $6\ \%$

C. $10\ \%$

D. $3\ \%$

Answer: C

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31. In the Kjeldahl's method for estimation of nitrogen present in a soil sample, ammonia avolved from 0.75 g of sample neutralized 10 mL of 1 M H_2SO_4. The percentage of nitrogen in the soil is

A. 35.33

B. 43.33

C. 37.33

D. 45.33

Answer: C

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32. In Duma's method for estimation of nitrogen, 0.25 g of an organic compound gave 40 mL of nitrogen collected at 300 K temperature and 725 mm pressure. If the aqueous tension at 300 K is 25 mm, the percentage of nitrogen in the compound is

A. 16.76

B. 15.76

C. 17.36

D. 18.20

Answer: A

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33. In Carcuc method for the estimation of halogens. 250 mg of organic compound gave 141 mg of $AgBr$. The percentage of bromine in the compound is :

A. 48

B. 60

C. 24

D. 36

Answer: C

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34. Paper chromatography has following mobile and stationary phases respectively

A. liquid, solid

B. solid, liquid

C. gas, liquid

D. liquid, liquid

Answer: D

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35. In Lassaigne's test, the following reagent is used to test the presence of both N and S.

A. $AgNO_3$

B. $FeCl_3$

C. Na_2S

D. $(CH_3COO)_2Pb.$

Answer: B

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36. In the Lassaigne's test for the detection of nitrogen in an organic compound, the appearance of blue coloured compound is due to

A. ferric ferricyanide

B. ferrous ferricyanide

C. ferric ferrocyanide

D. ferrous ferrocyanide

Answer: C

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37. The distillation techniquie most suited for separating glycerol from spent-lye in the soap industry is

A. simple distillation

B. fractional distillation

C. steam distillation

D. distillation under reduced pressure.

Answer: D

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38. A miscible mixture of benzene and chloroform can be separated by :

A. sublimation

B. distillation

C. filtration

D. Crystallisation

Answer: B

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