


Hints and Solutions

BOTANY

1. C.G.K. Ramanujam – Palynologist – Palynology. Aristotle – Father of Biology
2. 1, 2, 3, are correct In radish Cotyledons but not root
3. In pistia roots are modified
In Eichhornia and Casuarina – Root, stem and leaves are modified
But in Artabotrys Peduncle is modified into a hook.
4. Persistent stipules are present in Lathyrus, Ipomoea and Smilax.
∴ Deciduous stipules and gynoecium with free carpels are found in Michelia.
5. Special type of inflorescence with bisexual, chlamydeous flowers is found in Leucas special type of inflorescence with unisexual sessile flowers is found in Ficus.
6. Axile placentation and superior ovary are not found in the flowers mentioned above instead basal placentation and inferior ovary are seen in them.
7. Equational division without cytokinesis occurs initially in the functional megaspore of angiosperms.
8. Both dorsal and ventral sutures dehisce in Legume and loculicidal capsule.
9. The number of cohorts in the following series
Thalamiflorae = 6; Calyciflorae = 5; Disciflorae = 4
 Inferae = 3; Heteromerae = 3 ; Bicarpellatae = 4
10. outer four successive whorls of different genera belonging to liliaceae show either free condition or united condition.
11. Oil is obtained from the seeds of Gossypium and Derris.
Oil obtained from the seeds of Derris is used in the preparation of medicines.
12. Except plastids all other organelles are involved in the synthesis of biomembranes.
13. A = 7; B = 10; C = 16; D:8
14. m – RNA is synthesized from antisense strand or code complement and not from code copy.
15. – Collocytes contain 60% of water in their cellwalls
– Parenchyma cell contains thin Peripheral layer of Cytoplasm
16. Cuticle and stomata are absent in the eipdermis of root.
17. The correct sequence of tissues from inside to outside after secondary growth is
– Cork
– Phellogen
– Secondary cortex
– Primary cortex

18. Aloe is subjected to dryness externally only
 – Zizyphus is subjected to dryness both externally and internally
 – casuarina is subjected to dryness both externally and internally
 – Tribulus is not at all subjected to dryness
19. White \times white genotypes of parents should be $gg \times gg$ and not $gg \times Gg$
20. $2n - 2$ (Bivalent) is called nullisomic
21. (A) Spermatozoids of pteris are attracted by Malic acid
 (C) Spermatozoids of Funaria are attracted by Sucrose
22. Life cycle of Funaria is called haplodiplontic life cycle.
23. Filament of spirogyra and Hypha of Rhizopus show haploid nuclei.
24. Viruses do not remain alive outside the host as they are intracellular obligate parasites.
25. (B). Anthrax is caused by Bacillus anthracis which is rod shaped.
 (C) Pneumonia is caused by Diplococcus Pneumoniae
26. Highly reduced archegonia are present in gymnosperms.
27. Matric factors decrease the total number of free moelcules of water and also reduce the free energy of water.
28. DCMU is a weedicide. It inhibits the transport of e^- from PS – II to PS – I.
29. The mechanism involved to get rid off excessive Na^+ ions by salt resistant plants to outside through their roots is antiport mechanism 
30. Substrate moelcules converted into products by enzyme molecules (TON = 20) in 10 mts are 2400.
 \therefore Number of enzyme molecules participated is $\frac{2400}{20 \times 10} = 12$
31.
$$2A + 2H_2O \xrightarrow[\text{Isolated chloroplasts}]{\text{light}} 2AH_2 + O_2$$

Hydrogen acceptor
32. A and R are correct but R does not explain A.
33. Substrate level phosphorylation occurs in 1,3 and 4 reactions. substrate level phosphorylation does not occur in 2nd reaction and it is a isomerisation reaction.
34. t – RNA does not participate in Transcription (I)
 t – RNA participates in II, III and IV.
35. The asexual stage of Gibberellic Acid producing fungus namely Gibberella fuzi kuroi is Fusarium moniliformae.
36. Nostoc can can fix N_2 ($N \equiv N$) in symbotic association with Gunnera (stem glands) and Anthoceros (Thallus)
37. The product immediately produced after the second cross during the synthesis of Triticum aestivum contains ABD
 $3n = 3$ genomes
 $3 \times 7 = 21$ chromosomes
38. Cytokinins and auxins are used in Tissue culture to induce shoot and root formation respectively.

39. The correct sequence of stages which are concerned with insertion of isolated gene into a vector is.
- II. Treating the bacterial cell with EDTA and lysozyme
 - I. Protoplasmic centrifugation
 - III. Cutting the plasmid , IV. Ligation of plasmid with desired gene.
40. The “seed” material used for mushroom production is
Spawn (sterilized organic matter + small amount of mycelium of Agaricus.
(White button mushroom : Agaricus bisporus)

ZOOLOGY

41. (1) All sub species in a given species possess same ecological Niche and the ecological niche represent the functional role of an organism.
42. (4) I As the Nervous system of Hydra lacks brain is of diffuse type, nerve impulse can travel in any direction II, III-As per Text Book.
43. (4) First animals with Blood Vascular system are Annelids, but first animals with true muscles are Flat worms of platy helminthes.
44. (4) A) : Neomenia is aplacophoran and shell is absent
C) : Neoceratodus is Australian lung fish with only one Lung.
45. (3) The shell of helezooan is made up of Silica.
46. (2) Pyredoxin helps to produce antibodies but its defency results hypochromic microcytic anaemia. The antibody production is not related to RBC production.
47. (1) Arthropods with paired gonopores are crustaceans and they possess antennae and antennules.
48. (1) Match the following type
49. (3) In simple Gyration movement, the flagellum of Englena turns like a screw.
50. (2) Plasmotomy is an asexual reproduction in opalina.
51. (1) All 4 statements are correct in accordance with test book.
52. (1) In T. solium, vagina open in is to oviduct, but not in to ootype.
53. (1) If a same prey is predated by many organisms, then, it is Gamma Link.
54. (3) In pheretima, excretory pores are Nephridiophose and they are present in all the segments except first two anterior segments.
55. (2) Pheretima is Negatively phototactic and the photoreceptors are characterised by L-shaped Lens “Phaeosome” and the network of Nerve fibrillae.
56. (4) In cockroach, the Mesenteron is made up of endodermal, smooth cells and hence protected by peritropic membrane.
57. (4) In Honeybee, all the diploid individuals are not fertile as workers bee are sterile though they are diploid.
58. (4) Mandibles, Elongated Galea and the Dutton’s membrane are not the parts in Mouth parts of House Fly.
59. (4) The pyramid of Biomass is inverted as the dry weight of phytoplanktons is less than that of zooplankton as they are microscopic.
60. (2) After replacement of one seral stage by other seral stage a community is established in stable environment and it is “climax community”.
61. (4) Duck billed platypus possess mammary glands and hence it is a Mammal but it has cloaca which indicate that it retain reptilian characters.

62. (1) Dipnoians are lung Fishes and ratitae birds are flightless birds. But their distribution is not continuous as they exist only in certain axes.
63. (1) Antihæmorrhagic vitamin is vit K. It helps coagulation, hence, it is not an anticoagulant. Vitamins does not provide any energy. Hence their intake when reduced does not control obesity.
64. (4) 97% haemoglobin saturation does not occur in systemic veins as they carry deoxygenated blood. Central lobe is not the common lobe in lungs of rabbit.
65. (4) From Liver, hepatic veins carry blood to post caval veins then into Rt atrium where pulmonary circulation starts and through left systemic, coeliac and hepatic arteries, it enters to liver again.
66. ((2) Match the following as per text book
67. (3) The Functional unit of skeletal muscle is sarcomere, and it exists between two successive Z-lines. It has one complete A band and two halves of I band.
68. (3) A fall in B.P stimulates Renin release and finally Angiotensin II is formed which reduces GFR.
69. (4) As per text book
70. (2) Placenta in rabbit is haemoendothelial as foetal blood capillaries float in mother's blood and it is allanto chorionic as allantois attaches chorion for vascularisation.
71. (1) As per text book diagram.
72. (4) In rabbit, III, IV, VI, XI, XII are motor cranial nerves I, II and VIII are sensory and the rest are mixed.
73. (2) In Drosophila, Red eye colour is dominant and x-linked dominant and white eye colour is recessive and x-linked recessive. Only dominant character is expressed in heterozygous condition but recessive character always expressed only in homozygous condition.
74. (1) SCID is caused due to a mutation in a gene that encodes Adenosine Deaminase.
75. (4) Osteoblasts and Histocytes are not the macrophages even the Monocytes, only after entering the tissues from blood become Macrophages.
76. (3) Darwin's Natural selection explains survival of Fittest, but not arrival of Fittest as it cannot explain origin of variation.
77. (3) When parents are homozygous dominant or recessive, then all the progeny are of parental type only. Here both parent and new type of progeny are produced.
78. (4) Respiratory disorders are seen in Ranikhet, Brooder's pneumonia and Roup disease.
79. (4) Match the following as per text book.
80. (2) In genetic drift, an isolate group of individuals from a population are grown in new habitat, the resultant progeny resemble with isolate group and not the original population.

PHYSICS

81. Shall apply dimensional formula for each physical quantity.

82. $F_R = \vec{F}_1 + \vec{F}_2$

$$= \vec{r}_2 - \vec{r}_1$$

$$\omega = (F_R \cdot S)$$

83.
$$\frac{KE_{m_1}}{KE_{m_2}} = \frac{\frac{1}{2}mu_1^2 \cos^2 \theta_1}{\frac{1}{2}mu_2^2 \cos^2 \theta_2} = \frac{4}{1} \Rightarrow \frac{\cos \theta_1}{\cos \theta_2} = \frac{2}{1}$$

$$\frac{H_{m_1}}{H_{m_2}} = \frac{u_1^2 \sin^2 \theta_1 / 2g}{u_2^2 \sin^2 \theta_2 / 2g} = \frac{4}{1} \quad \frac{\sin \theta_1}{\sin \theta_2} = \frac{2}{1}$$

$$\frac{R_1}{R_2} = \frac{u_1^2 \sin^2 \theta_1}{u_2^2 \sin^2 \theta_2} = \frac{u_1^2 \sin \theta_1 \cos \theta_1}{u_2^2 \sin \theta_2 \cos \theta_2} = \frac{2}{1} \cdot \frac{2}{1} = \frac{4}{1}$$

84. In Case -1: $v = u + at = 0 + \frac{5}{s}(1) = 1m/s$

$$p = mv = 65(1) = 5 \text{ kg m/s}$$

$$E = \frac{1}{2}mv^2 = \frac{1}{2}(5)(1)^2 = 5/2$$

In Case -2 : $v^2 - u^2 = 2as$

$$v^2 = 2(1)(1) \Rightarrow v = \sqrt{2}$$

$$p^1 = 5\sqrt{2}$$

$$E^1 = \frac{1}{2}(5)(2) = 5 \text{ m/s}$$

$$\therefore p < p^1; E < E^1$$

85. $P_{gun} = P_{bullet}$

$$(2)(50) = 198(x)$$

$$x = \frac{100}{198} \approx 0.5 \text{ m/s}$$

86. $W = F.S. = \frac{K}{V} \cdot Vt = Kt$

87. $\frac{3}{4}$ th of KE lost means $\frac{1}{4}$ is remaining

$$KE^1 = \frac{1}{4}KE$$

$$\frac{1}{2}MV^1^2 = \frac{1}{4} \cdot \frac{1}{2}MV_0^2$$

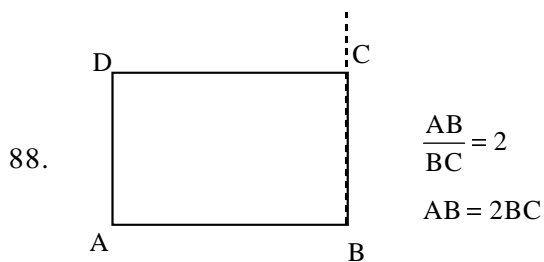
$$v^1 = \frac{v_0}{2}$$

$$v^1 = u + at$$

$$\frac{v_0}{2} = v_0 + at_0$$

$$a = \frac{v_0}{2t_0} = ug$$

$$\therefore u = \frac{v_0}{2gt_0}$$



$$L = 2AB + 2BC$$

$$= 2AB + AB = 3AB$$

$$AB = l / 3 = CD$$

$$BC = AD = l / 6$$

$$I \text{ about } BC = I_{AD} + I_{AB} + I_{BC}$$

89. $\frac{1}{2}mv^2 + \sum mr^2 = mgh$

90. $PE = \frac{Gm(1)}{R} = E$

Escape velocity $\sqrt{\frac{2Om}{R}} = \sqrt{2E}$

91. $V_{\max} = AW = A \frac{2\pi}{T} \Rightarrow T = \frac{2\pi A}{V_m}$

$$\text{Avgvel} = \frac{2A}{T} = \frac{4A}{T}$$

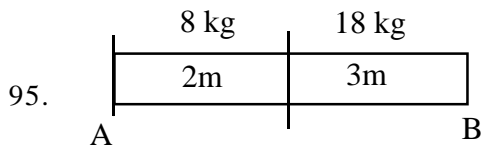
$$\therefore \text{Avgvel} = \frac{4AV_m}{2\pi A} = \frac{2V_m}{\pi}$$

92. Youngs modules = stress / strain

93. $T = \frac{F}{\ell}$

$$F = T\ell = 0.01 \times 2 = 0.02$$

94. Principal buoyancy



$$x_m = \frac{8(1) + 18(2 + 2.5)}{8 + 28}$$

96. Approximation

$$y = x^n$$

$$\frac{dy}{y} = \frac{ndx}{x}$$

97. $n = \frac{pV}{RT}$

$$n^1 = (2P) \frac{V}{2RT(2)} = \frac{n}{2}$$

98. $\frac{1}{2}(p)(t) = msT$

99. $KA \frac{(100 - \theta)t}{10} = \frac{KA(\theta - 20)t}{10}$

$$\Rightarrow \theta = 60^\circ$$

100. $E = \sigma T^4 A$

$$\frac{E_1}{E_2} = \left(\frac{T_1}{T_2}\right)^4 \left(\frac{l_1}{l_2}\right)^2 = \frac{1}{1}$$

101. When grazing $\mu = \frac{1}{\sin C}$

102. $\frac{1}{f} = (\mu - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$

$$\frac{f_1}{f} = \frac{a^\mu g - 1}{m^\mu g - 1}$$

$$\frac{p}{p^1} = \frac{1.5 - 1}{\frac{1.5}{1.6} - 1} \Rightarrow \frac{-5D}{p^1} = \frac{0.5 \times 1.6}{-0.1} = p^1 = \frac{5}{8}D$$

103. Only transverse waves can be polarised.

104. In Case – 1:

$$B_e - B_H = 8B_H - B_H = 7B_H$$

In Case – 2:

$$B_H - \frac{B_H}{8} = \frac{7B_H}{8}$$

$$\text{Ratio} = \frac{8}{1}$$

105. $P_{5\Omega} = i_1^2 R$

$$45 = i_1^2 \cdot 5 \Rightarrow i_1 = 3 \text{ and } 5\Omega \parallel 15\Omega$$

$$\therefore i_2 = 4 \text{ amp}$$

$$i = i_1 + i_2 = 1 \text{ amp}$$

$$p = i^2 R = 4^2 (12) = 192 \text{ watt}$$

106. Susceptibility increases as magnetic nature increases.

$$107. \frac{1}{2} mv^2 = \frac{1}{4\pi \epsilon_0} \cdot \frac{q_1 q_2}{r}$$

108. $\delta^1 = KC$

109. In the graph $\tan \theta$ with x-axis is $\frac{V}{i} = R$

$$110. T = \frac{8 \times 10^{-3}}{10 \times 10^{-6}} = 800^\circ\text{C}$$

This is for 8Ω

for each one ohm $\Delta T = 100^\circ\text{C}$

for 1.6Ω , $DT = 160^\circ\text{C}$

$$\therefore \text{Total temperature} = 800 + 160 = 960^\circ\text{C}$$

$$111. B = \frac{\mu_0 ni}{2r}$$

$$M = niA$$

$$\frac{B}{M} = \frac{\mu_0}{2r} \cdot \frac{1}{A} \propto \frac{1}{r^3}$$

$$\left(\frac{B}{M}\right)_1 = \left(\frac{l_2}{l_1}\right)^3 = \left(\frac{2l}{l}\right)^3 = 8$$

$$\left(\frac{B}{M}\right)_2 = \frac{x}{8}$$

$$112. \epsilon = \frac{-d\phi}{dt} = \frac{-d}{dt}(BAN)$$

$$= \frac{BN}{t} d(A)$$

113. for closed pipe $n_1 = \frac{v}{4l}$

for open pipe $n_2 = \frac{v}{2l}$

$$\therefore \frac{v}{2l} - \frac{v}{4l} = 2$$

$$\Rightarrow \frac{v}{4l} = 2 \Rightarrow v = 8l$$

In Case (2)

$$\frac{v}{2(l/2)} - \frac{v}{4(2l)} = \frac{v}{l} - \frac{v}{8l}$$

$$= \frac{8l}{l} - \frac{8l}{l} = 8 - 1 = 7$$

114. $n^1 = \frac{v + v_0}{v - v_s} n$

115. Conceptual

116. $\frac{hc}{\lambda} = w + k$

117. $N = N_0 e^{-\lambda t}$

$$900 = 1000 e^{-\lambda(2)} \Rightarrow \frac{9}{10} = e^{-2\lambda}$$

in Case - 2

$$x = 1000 e^{-4\lambda}$$

$$= 1000 \left(\frac{9}{10} \right) \left(\frac{9}{10} \right)$$

$$= 810.$$

118. Resistant LR circuit $= \sqrt{e^2 + L^2 W^2}$

where $\tan \phi = \frac{LW}{R}$

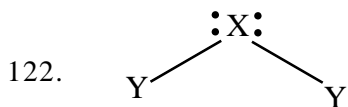
119. $\beta = \frac{\alpha}{1 - \alpha} = \frac{0.98}{1 - 0.98} = 49$

$$\beta = \frac{I_C}{I_B}$$

120. Conceptual

CHEMISTRY

121. Due to short lived dipoles \therefore of motion of e^- around atoms.



123. Lyman (H) :-

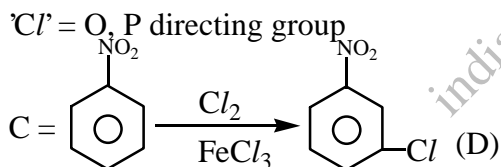
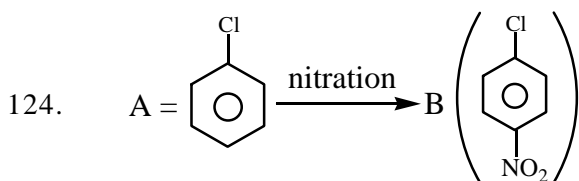
$$\frac{1}{\lambda_1} = R \quad \therefore \lambda_1 = \frac{1}{R} = x (\because n_2 = \infty)$$

Paschen (He^+): $\lambda_2 \rightarrow \text{max}$

$$\frac{1}{\lambda_2} = R \left[\frac{1}{9} - \frac{1}{16} \right] 4 = \frac{20R}{144}$$

$$\lambda_2 = \frac{144}{20R}$$

$$\therefore \frac{\lambda_1}{\lambda_2} = \frac{x}{\lambda_2} = \frac{20}{144} = \frac{5}{36}$$



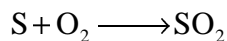
$-\text{NO}_2$: m directing group.

125. $K_{sp} = S^2$ (to AB type)
if 'S' decreases; K_{sp} also decreases.

126. $\left(\frac{\lambda_A}{\lambda_B} \right) = \frac{1}{2} \left(\lambda = \frac{h}{p} \right)$

127. Sulphide over

128. wt. of 'S' burn = 48 gr. (50 - 2)



$$32 \quad 22.4$$

$$48 \quad ? = 33.6 \text{ lit.}$$

air : - 100 lit air \longrightarrow 21 lit O_2

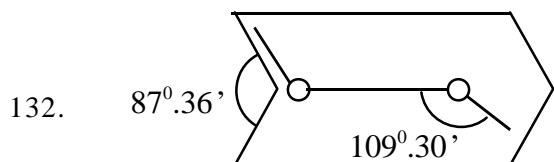
 ? \longleftarrow 33.6 lit O_2

= 160 lit

129. $\text{XeF}_2, \text{I}_3^- \longrightarrow \text{linear}$

130. $\text{IV} = 0.303\% = 0.0893\text{M} = 0.1786 \text{ N}$

131. $(\text{IV} = \text{Na}_2\text{CO}_3 + \text{SiO}_2 \rightarrow \text{Na}_2\text{SiO}_3 + \text{CO}_2)$



133. O₃, NO, NO₂ and CFC

134.
$$P = \frac{4RT}{V} = \frac{3 \times 22.4 \times 546}{273 \times 10} = 13.44 \text{ atm}$$

$$P_{\text{HE}} = 13.44 \times \frac{1}{3} = 4.48 \text{ atm}$$

135.
$$K = \frac{1}{t} \cdot \ln \frac{a}{(a-x)}$$

$$K = \frac{1}{t_{1/2}} \cdot \ln \frac{0.5}{0.25}$$

$$t_{1/2} = \frac{\ln 2}{k}$$

136. Pt and Pd



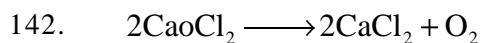
138. 1^o amines gives black ppt of HgS.

139. Condensation of CH₃COCH₃ in pressure of Ba(OH)₂ gives diacetone alcohol.

140. (ii) solubility decreases

(iii) do not contain water.

141. Both statements are independently correct.



143. Though glucose is a Carboxyl it does not react with bisulphite.

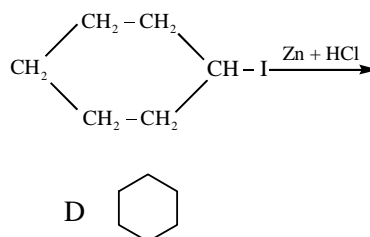
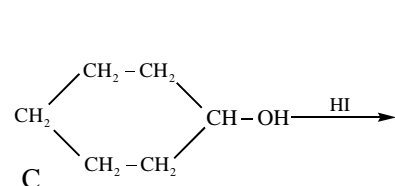
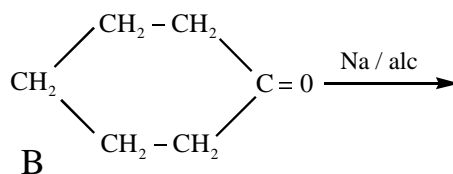
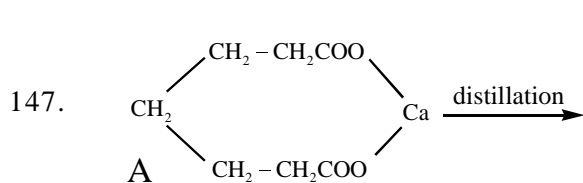
144. (iii - % s in abonite : 40 - 45)

145. $2\text{AN} = [\text{Z-OS} + 2(\text{x})]$

$$36 = 26 - 0 - 2x$$

$$2x = 10 = x = 5.$$

146. 0.01M NaCl \longrightarrow 0.02M ions. so no. of particle in both solution are same.



148. Longmuir's equation is $\frac{x}{m} = \frac{aP}{1 + bP}$

149. $\Delta H = (4 \times 90) - (2 \times 86)$
 $= 196 \text{ KJ}$

150. $K_f = K_b \quad \therefore K=1$

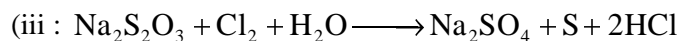
2 Lit :	2	2	
1 Lit :	1	1	
	x	x	2x
	(1 - x)	(1-x)	2x

$$K = \frac{4x^2}{(1-x)^2}$$

$$1 = \frac{2x}{1-x} \quad \therefore 3x=1; \quad x=\frac{1}{3}$$

$$\therefore \% = \frac{1}{3} \times 100 = 33.3$$

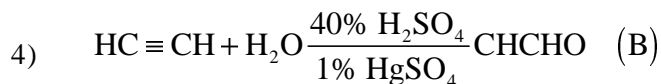
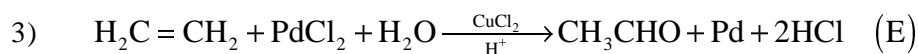
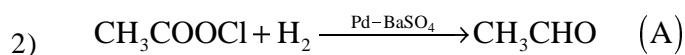
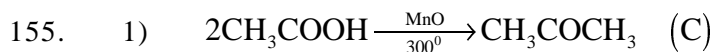
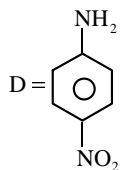
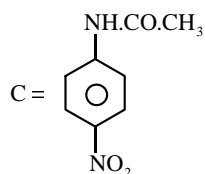
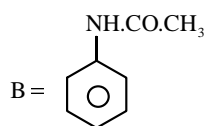
151. (ii - by oxidation)



152. They are one and the same

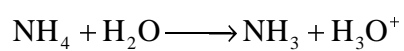
153. 3^0 alkyl group forms 3^0 halide

154. $A = \text{C}_6\text{H}_5\text{NH}_2$



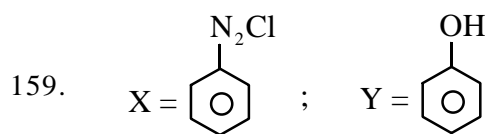
156. $\% \text{ S} = \frac{32}{233} \times \frac{\omega \text{ t BaSO}_4}{\omega \text{ t.comp}} \times 100$

157. due to cationic Hydrolysis.

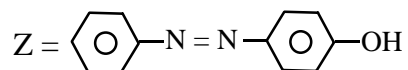


158. $\text{Cu}^{+2} \xrightarrow[(2F)]{2e^-} \text{Cu}$

so total Cu^{+2} ion reduced to Cu.



$\text{X} + \text{Y} =$ coupling reaction.



160. (iii :- artificial sweetner)