SAFE HANDS & IIT-ian's PACE

EDT-18 (NEET) SOLUTIONS

1) $\lambda_0 = \frac{h}{mv_0}$

& $\lambda = \frac{h}{m(v_0 + \frac{qE}{m}t)}$ $\therefore$ $\boxed{\lambda = \frac{\lambda_0}{(1+\frac{eE}{mv_0}t)}}$

$\therefore$ option (1)

2) $E = w_0 + \frac{1}{2}mv^2$

$hv = hv_0 + \frac{1}{2}mv^2$ $\therefore$ $hv_0 = \frac{1}{2}mv_1^2$

& $4hv_0 = \frac{1}{2}mv_2^2$

$\therefore \frac{v_1}{v_2} = \frac{1}{2}$ $\therefore$ option (1)

3) $KE = \frac{3}{2}kT$

& $\lambda = \frac{h}{P} = \frac{h}{\sqrt{2mKE}} = \frac{h}{\sqrt{3mkT}}$ $\therefore$ option (1)

4) $K_{max} = hv - \phi_0 \rightarrow \frac{hc}{\lambda} - \frac{hc}{\lambda_0}$

$K_{max} = hv - hv_0$

$\therefore KE_{max} = hc\left(\frac{1}{\lambda} - \frac{1}{\lambda_0}\right)$ $[m = 9.1\times10^{-31}]$

$\therefore KE_{max} = 12420\ eV \approx 12400\ eV$

$E = \frac{hc}{\lambda} = \frac{12400}{\lambda}$ eV where λ is in Å

$\therefore \frac{1}{2}\times 9.1\times10^{-31}\times v^2 = 12400\left(\frac{1}{2536} - \frac{1}{3250}\right)eV$

$\therefore v^2 = \frac{2\times12400\left(\frac{1}{2536} - \frac{1}{3250}\right)\times1.6\times10^{-19}}{9.1\times10^{-31}}$

$\therefore \boxed{v = 6\times10^5\ m/s}$ $\therefore$ option (4)

5) max k.E of photon $= \frac{hc}{\lambda_0}$

& KE of $e^{\ominus} = \frac{P^2}{2m} = \frac{(h/\lambda)^2}{2m} = \frac{h^2}{2m\lambda^2}$

$\therefore \frac{hc}{\lambda_0} = \frac{h^2}{2m\lambda^2}$ $\therefore \boxed{\lambda_0 = \frac{2mc\lambda^2}{h}}$

$\therefore$ option (1)

6) $KE_{max} = E_p - \phi$ $\therefore$ $2 = 5 - \phi$ $\therefore \boxed{\phi = 3eV}$

now for $E_p = 6eV$ $\boxed{KE_{max} = 3eV}$

$\therefore$ so for not reaching $e^{\ominus}$ at A it should be at $-ve$ potential

& $-e(V_A - V_C) = 3eV$

$\therefore$ option (4)

7) $\lambda_{electron} = \frac{h}{P} = \frac{h}{\sqrt{2mE}}$

& for photon $\rightarrow E = hv = \frac{hc}{\lambda_p}$

$\therefore \frac{\lambda_e}{\lambda_p} = \frac{h/\sqrt{2mE}}{hc/E} = \frac{1}{c}\sqrt{\frac{E}{2m}}$

8) $eV_0 = hc\left(\frac{1}{\lambda} - \frac{1}{\lambda_0}\right)$

$\therefore eV = hc\left(\frac{1}{\lambda} - \frac{1}{\lambda_0}\right)$

& $eV/4 = hc\left(\frac{1}{2\lambda} - \frac{1}{\lambda_0}\right)$

$\therefore 4 = \frac{\left(\frac{1}{\lambda} - \frac{1}{\lambda_0}\right)}{\left(\frac{1}{2\lambda} - \frac{1}{\lambda_0}\right)}$ $\therefore \frac{2}{\lambda} - \frac{4}{\lambda_0} = \frac{1}{\lambda} - \frac{1}{\lambda_0}$

$\therefore \frac{1}{\lambda} = \frac{3}{\lambda_0}$

$\therefore \boxed{\lambda_0 = 3\lambda}$ $\therefore$ option (2)

9) $E = \frac{hc}{\lambda} - \phi_0$ $\therefore$ $\frac{3hc}{\lambda} - 3\phi_0 = \frac{2hc}{\lambda} - \phi_0$

& $3E = \frac{hc}{\lambda/2} - \phi_0$ $\therefore$ $\frac{hc}{\lambda} = 2\phi_0$ $\therefore \boxed{\phi_0 = \frac{hc}{2\lambda}}$

$\therefore$ option (3)

10) $KE_{max} \leq \frac{hc}{\lambda} - \phi_0$

$= \frac{12400}{5000}eV - 2.28\ eV$

$= (2.48 - 2.28) = 0.2\ eV$

$\therefore \lambda_{min} = \frac{h}{\sqrt{2m\,KE_{max}}}$

$\therefore \lambda_{min} = \frac{6.6\times10^{-34}}{\sqrt{2\times9.\times10^{-31}\times0.2(1.6\times10^{-19})}}$

$= \frac{6.6}{2.4}\times10^{-9} = 2.8\times10^{-9}m$

$\therefore \boxed{\lambda \geq 2.8\times10^{-9}m}$ $\therefore$ option (1)

11) $\lambda = h/P$ $\therefore \lambda P = $ const $\therefore$ option (4)

12) $eV_0 = hc\left(\frac{1}{\lambda} - \frac{1}{\lambda_0}\right)$

$\therefore e(3V_0) = hc\left(\frac{1}{\lambda} - \frac{1}{\lambda_0}\right)$

& $e(V_0) = hc\left(\frac{1}{2\lambda} - \frac{1}{\lambda_0}\right)$

$\therefore 3\left(\frac{1}{2\lambda} - \frac{1}{\lambda_0}\right) = \frac{1}{\lambda} - \frac{1}{\lambda_0}$

$\frac{1}{2\lambda} = \frac{2}{\lambda_0}$ $\therefore \boxed{\lambda_0 = 4\lambda}$

$\therefore$ option (4)

13) $KE = h\nu - \phi_0$

$0.5 = h\nu - \phi_0$

$0.8 = 1.2h\nu - \phi_0$

$\therefore 1.2(0.5 + \phi_0) = 0.8 + \phi_0$

$\therefore 0.2\phi_0 = 0.2$ $\boxed{\phi_0 = 1\,eV}$ $\therefore$ option (2)

14) $\lambda = \dfrac{h}{\sqrt{2mKE}}$ $\lambda' = \lambda/4$ $\therefore$ % change 75%

$\therefore$ option (2)

15) $\lambda_e = \dfrac{h}{\sqrt{2m_e KE}}$ & $\lambda_{Photon} = \dfrac{hc}{E}$

$\therefore E = \dfrac{h^2}{2m_e\lambda_e^2}$ & $E = \dfrac{hc}{\lambda_p}$

$\therefore \boxed{\lambda_p \propto \lambda_e^2} \rightarrow$ option (3)

16) $\phi_0 = h\nu$ & $\frac{1}{2}mv_{max}^2 = h(2\nu) - h(\nu)$

$\boxed{\frac{1}{2}mv_{max}^2 = h\nu}$ $\therefore$ option (1)

17) by reducing the distance intensity will increase. but stopping potential is independent of intensity.

$\therefore$ option (2)

18) Eng of Photon $= \dfrac{hc}{\lambda} = \dfrac{12400}{6000\times10^{-10}}\times1.6\times10^{-19}\,J$

$\therefore$ no. of photons $= \dfrac{200\times\frac{25}{100}}{\frac{12400}{6000\times10^{-10}}\times1.6\times10^{-19}}$

$= 1.5\times10^{20}$ $\therefore$ option (1)

19) for hydrogen atom, $E_n = -\dfrac{13.6}{n^2}\,eV$

$\therefore E_1 = -13.6\,eV$ & $E_2 = -3.4\,eV$

$\therefore$ eng of emitted photon $\Rightarrow 10.2\,eV$

now max KE $= eV_0$ ($V_0 \rightarrow$ stopping potential)

$= 1.6\times10^{-19}\times3.57\,J$

$= 3.57\,eV$

$\therefore KE_{max} = h\nu - h\nu_0$

$\therefore 3.57 = 10.2 - h\nu_0$ $\therefore h\nu_0 = 6.63\,eV$

$\therefore \nu_0 = \dfrac{6.63\,eV}{6.63\times10^{-34}} = \dfrac{6.63\times1.6\times10^{-19}}{6.63\times10^{-34}}$

$\boxed{\nu_0 = 1.6\times10^{15}\,Hz}$

$\therefore$ option (3)

20) $R = \dfrac{mv}{qB}$ $\therefore mv = qBR = 2\times1.6\times10^{-19}\times\frac{1}{4}\times0.83\times10^{-2}$

& $\lambda = \dfrac{h}{mv} = \dfrac{6.6\times10^{-34}}{2\times1.6\times10^{-19}\times\frac{1}{4}\times0.83\times10^{-2}}$

$\therefore \boxed{\lambda = 0.01\,\mathring{A}}$ $\Rightarrow$ option (4)

21) $\lambda = h/p$ $\therefore \dfrac{\Delta p}{p} = -\dfrac{\Delta\lambda}{\lambda}$

$\therefore \dfrac{p}{p_{initial}} = \dfrac{0.5}{100}$ $\therefore \boxed{p_{initial} = 200p}$

$\therefore$ option (1)

22) $KE_{max_1} = 1 - 0.5 = 0.5\,eV$ $\therefore \dfrac{v_1^2}{v_2^2} = 1/4$

& $KE_{max_2} = 2.5 - 0.5 = 2\,eV$

$\therefore$ option (2) $\boxed{\dfrac{v_1}{v_2} = \dfrac{1}{2}}$

23) option (4)

24) option (1)

25) $\lambda = \dfrac{12.27}{\sqrt{V}}\,\mathring{A}$ $\therefore \dfrac{\lambda_1}{\lambda_2} = \sqrt{\dfrac{V_2}{V_1}} = 2$

$\therefore \boxed{\lambda_2 = \dfrac{\lambda_1}{2}}$ $\therefore$ option (2)

26) Stopping potential $\Rightarrow V_0$

$\therefore eV_0 = KE_{max} = 0.5\,eV$

$\therefore \boxed{V_0 = 0.5}$ $\therefore$ option (3)

27) $eV_0 = h\nu - h\nu_0$

$\therefore V_0 = \dfrac{6.63\times10^{-34}(8.2\times10^{14} - 3.3\times10^{14})}{1.6\times10^{-19}} \approx 2V$

$\therefore$ option (2)

28) for S_1, $\Rightarrow N_1 = 10^{15}$ Photons/sec

& $\lambda_1 = 5000\,\mathring{A}$

$\therefore E_1 = \dfrac{hc}{\lambda_1} = \dfrac{12400}{5000}\,eV$

$\therefore$ Power of source $= \dfrac{N_1 hc}{\lambda_1} = 10^{15}\times\dfrac{12400}{5000}\,eV$

llly Power of $S_2 = \dfrac{1.02\times10^{15}\times12400}{5100}\,eV$

$\therefore \dfrac{P_{S_1}}{P_{S_2}} = \dfrac{10^{15}/5000}{1.02\times10^{15}/5100} = \dfrac{5100}{5000}\times\dfrac{1}{1.02} = 1$

$\therefore$ option (1)

29) $\frac{1}{2}mv_{max}^2 = h\nu - \phi$

$\therefore eV_0 = \dfrac{12400}{2000}\,eV - 5.01\,eV$

$eV_0 = 1.19\,eV$ $\therefore \boxed{V_0 = 1.19\,V}$

$\therefore$ Potential diff. applied $= -1.2V$

$\therefore$ option (2)

30) option (2)

31) E = eng released = $h\nu = E_3 - E_1$

$= -13.6\left(\frac{1}{3^2} - \frac{1}{2^2}\right)$

$\boxed{h\nu = 12.1\,eV}$

$\therefore eV_0 = h\nu - \phi = 12.1 - 5.1 = 7\,eV$

$\therefore \boxed{V_0 = 7V}$

32) option (2)

33) option (1)

34) $\lambda = 6670\,\text{Å}$

$\therefore E = \frac{12400}{6670}\,eV = \frac{12400}{6670} \times 1.6\times10^{-19}$

& eng. emitted per sec = Power

$\therefore \quad = 9\times10^{-3}\,J/s$

no. of photons/sec $= \frac{9\times10^{-3}\times 6670}{12400\times1.6\times10^{-19}}$

$= 3\times10^{16}$ option (1)

35) $ke_{max} = 5eV$ & $\phi = 6.2\,eV$

$\therefore \frac{hc}{\lambda} = 11.2\,eV \quad \therefore \lambda = \frac{12400}{11.2}\,\text{Å}$

$\therefore \boxed{\lambda = 1107\,\text{Å}}$ → this is in UV region

36) $\lambda = \frac{h}{mv} \Rightarrow \frac{h}{10^{-6}\times V} = \frac{h}{9.1\times10^{-31}\times 3\times10^{6}}$

$V = \frac{9.1\times10^{-31}\times 3\times10^{6}}{10^{-6}}$

$= 27.3\times10^{-19} = 2.7\times10^{-18}$

$\therefore$ option (3)

37) option (a)

38) $P = N.h\nu \quad \therefore N = \frac{2\times10^{-3}}{6.63\times10^{-34}\times 6\times10^{14}}$

$\therefore \boxed{N = 5\times10^{15}}$ $\therefore$ option (4)

39) for light source of power P

Intensity at a dist d is $= \frac{P}{4\pi d^2}$

$\therefore \frac{I_1}{I_2} = \left(\frac{1}{0.5}\right)^2 \therefore \boxed{I_2 = I_1/4}$

$\therefore$ no. of photoelectrons will reduce by a factor of 4 $\therefore$ option (4)

4•) $k = h\nu + E_0$

$k' = h(2\nu) + E_0 = 2(k - E_0) + E_0$

$\therefore \boxed{k' = 2k - E_0}$

also $k' = h\nu + h\nu + E_0 = h\nu + k$

$\therefore$ option (1)

40) option (3)

42) $E = 1\,MeV$

$P = \frac{E}{C} = \frac{10^6\times 1.6\times10^{-19}}{3\times10^8} = 0.53\times10^{-21}$

$\approx 5\times10^{-22}$ m/s $\therefore$ option (1)

43) $E = \frac{hc}{\lambda} = \frac{12400}{4100}\,eV = 3.02\,eV$

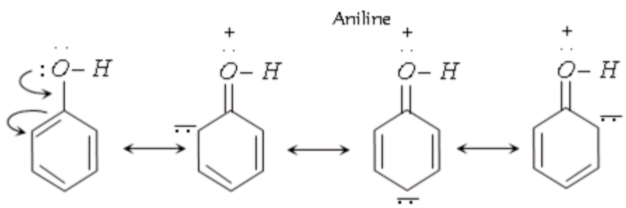
$\therefore$ option (2)

44) option (4)

45) option (4)

46. (b)
Sol. C_2H_5OH gives iodoform test having α-hydrogen atom while CH_3OH does not give due to the absence of α-hydrogen atom.

47. (a)
Sol.



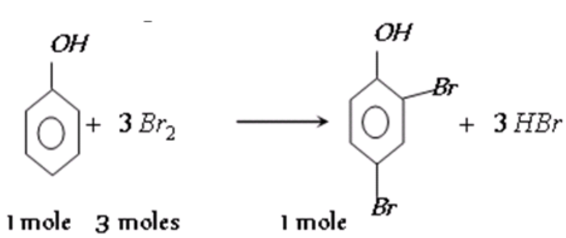
Oxygen atom of $-OH$ group acquires positive charge.

48. (b)
Sol. Carbylamine reaction

$$CHCl_3 + CH_3NH_2 + \underset{\text{alc.}}{3KOH} \rightarrow \underset{\substack{\text{Methyl}\\\text{isocyanide}}}{CH_3N \equiv C} + 3KCl + 3H_2O$$

49. (a)
Sol. $CH_3-\underset{\underset{OH}{|}}{C}H-CH_3 \xrightarrow{[O]} CH_3-\underset{\underset{O}{\|}}{C}-CH_3$

50. (c)
Sol.



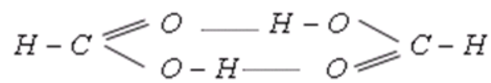
94 grams of phenol reacts with 480 gms. of Br_2.

2 gm. of phenol — $\frac{480}{94} \times 2 = 10.22$ gms.

51.(a)
Sol. $CH_3COOH + CH_3OH \xrightarrow[\text{Esterification}]{} CH_3COOCH_3 + H_2O$

52. (b)
Sol. CH_3OH has highest boiling point because of hydrogen bonding.

53. (b)
Sol.



Formic acid forms dimer due to which strength of $H-$bond increases Hence, boiling point increases.

54. (a)
Sol. $\underset{\substack{1^o\text{ alcohol}\\A}}{CH_3CH_2OH} \xrightarrow{\text{Oxi.}} CH_3CHO \xrightarrow{\text{Oxi.}} CH_3COOH$

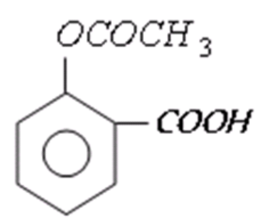
$\downarrow$ Ammonical $AgNO_3$

Silver Mirror

55. (b)
Sol. $CH_3CH_2-OH + HO-CH_2-CH_3 \xrightarrow[140^o C]{\text{Conc. } H_2SO_4}$

$$\underset{\text{Diethyl ether}}{CH_3CH_2-O-CH_2-CH_3} + H_2O$$

56. (b)
Sol.



Aspirin or Acetyl salicylic acid.

57. (c)
Sol. Due to presence of methyl alcohol in liquor.

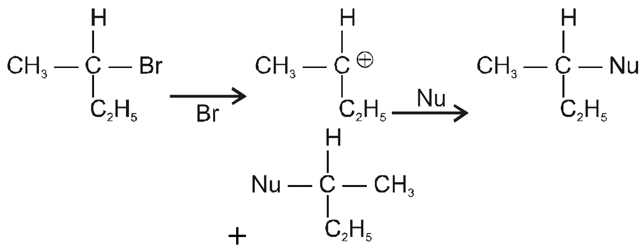
58. (d)
Sol. An anaesthetic.

59. (a)

Sol. Glycol is used as an antifreeze for automobile radiators because it lowers down the melting point of water.

60. (b)

Sol.



61. (b)

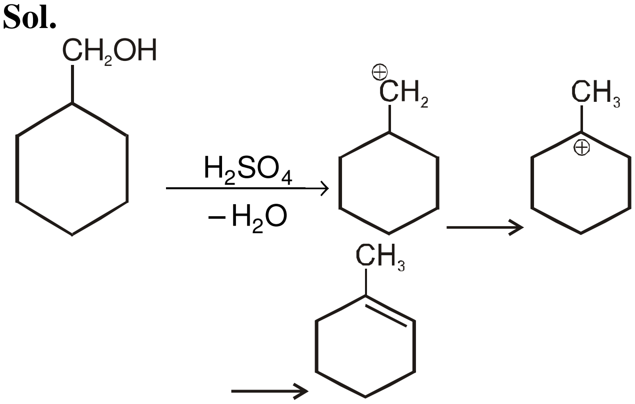
Sol.

$$CH_3-CH_2-\underset{}{\overset{OH}{\overset{|}{C}}}H-CH_3 \xrightarrow{SOCl_2} CH_3-CH_2-\overset{Cl}{\overset{|}{C}}H-CH_3$$

It is S_Ni mech so retenion of configuration.

62. (b)

Sol.



63. (d)

Sol. Phenyl group decreases the extent of H-bonding so solubility decreases.

$\longrightarrow$ Ph–C(=O)–CH_2OH

64. (b)

Sol. $\overset{5}{C}H_3\,\overset{4}{C}H_2\,\overset{3}{C}H_2\,\overset{2}{C}H-CH_2CH_3$ with ${}^1CH_2OH$ on C-2

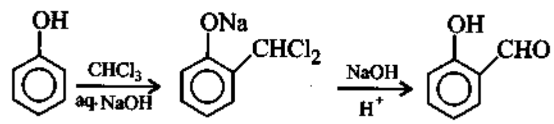
2–Eithylpen tan–1–ol

65. (c)

Sol. $C-O-C$ angle in ethers is about 110º

66. (c)

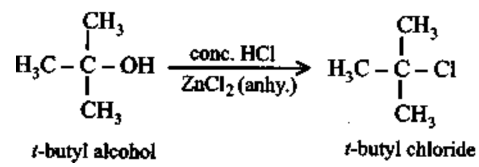
Sol.



This reaction is Reimer-Tiemann reaction

67. (a)

Sol.



68. (b)

Sol. Phenol is less acidic than o-nitrophenol as electron withdrawing $(-NO_2)$ group increase the acidity of phenols while electron donating groups $(-CH_3,-OCH_3)$ decrease the acidity of phenols. Phenols are more acidic than alcohols.

69. (d)

Sol. Halogens have both +R and $-I$ effect, but the –I effect predominates over the +R effect. Therefore, m-Chlorophenol is most acidic due to electron withdrawing –Cl group. Alcohols are less acidic than phenol.

70. (c)

Sol. $CH_3-\underset{CH_3}{\overset{OH}{C}}-\underset{CH_3}{\overset{OH}{C}}-CH_3$

2,3–Dimethyl–2,3bu tan ediol

It has two tertiary alcoholic groups.

71. (b)

Sol. The order of reactivity of hydrogen halides is

HI > HBr > HCl

72. (a)

Sol.

$(CH_3)_3C-CH_2OH \xrightarrow[170°]{Conc.H_2SO_4} (CH_3)_2=CHCH_3$

73. (d)

Sol. PCC is the best reagent to oxidize alcohols to aldehydes.

74. (d)

Sol. $CH_3COOH \xrightarrow[-H_2O]{NaOH} CH_3COONa$

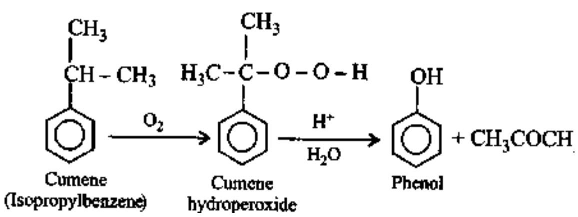
$CH_3CONH_2 \xrightarrow{NaOH} CH_3COONa + NH_3$

$C_6H_5OH \xrightarrow{NaOH} C_6H_5ONa + H_2O$

But alcohols are weakly acidic even weaker than water and react with alkali metal to form alkoxides and not with alkalies.

75. (d)

Sol.



76. (c)

Sol. $\underset{(X)}{C_2H_5OH} + HI \rightarrow C_2H_5I + H_2O$

$\underset{(Y)}{CH_3OCH_3} + HI \rightarrow CH_3I + CH_3OH$

77. (a)

Sol. $C_2H_5OCH_3 + HI \rightarrow C_2H_5OH + CH_3I$

Halogen goes with the smaller group on cleavage of ether.

78. (c)

Sol. The correct order of reactivity of alcohols towards Lucas reagent (Conc. HCl and $ZnCl_2$) is : $3° > 2° > 1°$ in case of tertiary alcohols turbidity is produced immediately as they form the halides easily. Primary alcohols do not produce turbidity at room temperature.

79. (c)

Sol. II, III

80. (a)

Sol. Phenol (C_6H_5OH) will react with sodium hydroxide solution in water, as phenols are more acidic than alcohols.

81. (a)

Sol. When fossil fuel burnt in automobile engines different oxides like NO, NO_2, SO_2, SO_3 are produced. In the presence of moisture these oxides convert in the acids. These acids comes down from the atmosphere in the form of rain, called acid rain.

$S \text{ (from fossil fuel)} + O_2 \longrightarrow SO_2$

$SO_2 + O_3 \longrightarrow SO_3 + O_2$

$SO_2 + H_2O_2 \longrightarrow H_2SO_4$

$SO_3 + H_2O \longrightarrow H_2SO_4$

$2NO_2 + H_2O \longrightarrow HNO_3 + HNO_2$

82. (a)

Sol. Green house gases are, CO_2, CH_4, O_3 N_2O and CFCS water vapours.

83. (c)

Sol. Green chemistry is the way by which the pollution or deterioration to the environment is minimises, nuclear chemistry is not the part of green chemistry.

84. (d)

Sol. Ultraviolet radiation from sum produces ozone. $3O_2 \xrightarrow{UV} 2O_3$.

85. (d)

Sol. Pathogens include bacteria and other oganisms that enter water from domestic sewage and animal excreta.

PCBs (Polyuchlorinated biphenyls) are used as a fluids in transformers and capacitators. The presence of these PCBs in water causes skin disorder in human. These act as carcinogenic.

86. (a)
Sol. DDT is non-biodegradable pollutant.

87. (d)
Sol. Freons are gases named as chlorofluoro carbons CF_2Cl_2 etc.

88. (c)
Sol. Carbon dioxide, methane, water vapour, nitrous oxide, CFCs and ozone are greenhouse gases.

89. (b)
Sol. CO_2 is not regarded as pollutant.

90. (b)
Sol. H_2SO_4 and HNO_3 are two strong acids present in acids rain.

91- c

92- b

93- d

94- a

95- b

96.- a

97- b

98- b

99- b

100 -a

101- d

102- d,.

103- b

104- d

105- b

106- c

107- d

108- b

109- a

110- b

111- c

112- a

113- b

114- a

115- b

116- b

117- d

118- b

119- c

120- a, For 5 fragments , EcoRI has to make cuts at 4 sites. At every site , $\begin{matrix} 5' \text{—— GAATTC ——} 3' \\ 3' \text{—— CTTAAG ——} 5' \end{matrix}$, this palindrome is cut after G from 5' side. So for each palindrome 2 cuts in phosphodiester bonds, total 8. After that middle 4 AT base pairs will be separated by breaking 2 hydrogen bonds of each, so total 8 H-bond broken at one site so 32 broken at 4 sites.

121- a

122- b

123- d

124- a

125- c

126- a

127- c

128- a,

129- c

130- d

131- b

132- c

133- c

134- c

135- a

136- d

137- c

138- a

139- c

140- d

141- c

142- c

143- b

144- d

145- a

146- d

147- a

148- c

149- a

150- d

151- c

152- c

153- b

154- b

155- a

156- a

157-a

158- d

159- c

160- c

161- b

162- d

163- b

164- b

165- b

166- d

167- b

168- c

169- c

170- b, Use of Killed or attenuated organisms is first generation vaccine and Third generation vaccines are DNA vaccines

171- c

172- a

173- d

174- c

175-a

176- a

177- c

178- b

179- b

180- a