# AITS FULL TEST-11

## ANSWER KEY

### PHYSICS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Q.1** (4) | **Q.2** (4) | **Q.3** (4) | **Q.4** (3) | **Q.5** (4) | **Q.6** (3) | **Q.7** (4) | **Q.8** (4) | **Q.9** (3) | **Q.10** (4) |
| **Q.11** (3) | **Q.12** (4) | **Q.13** (4) | **Q.14** (1) | **Q.15** (4) | **Q.16** (2) | **Q.17** (4) | **Q.18** (3) | **Q.19** (2) | **Q.20** (3) |
| **Q.21** (3) | **Q.22** (4) | **Q.23** (4) | **Q.24** (2) | **Q.25** (4) | **Q.26** (4) | **Q.27** (1) | **Q.28** (2) | **Q.29** (2) | **Q.30** (3) |
| **Q.31** (4) | **Q.32** (2) | **Q.33** (3) | **Q.34** (4) | **Q.35** (4) | **Q.36** (3) | **Q.37** (2) | **Q.38** (1) | **Q.39** (1) | **Q.40** (3) |
| **Q.41** (1) | **Q.42** (4) | **Q.43** (2) | **Q.44** (2) | **Q.45** (1) | **Q.46** (3) | **Q.47** (3) | **Q.48** (4) | **Q.49** (4) | **Q.50** (1) |

### CHEMISTRY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Q. 51** (2) | **Q. 52** (4) | **Q.53** (2) | **Q.54** (1) | **Q.55** (2) | **Q.56** (2) | **Q.57** (2) | **Q. 58** (2) | **Q.59** (2) | **Q.60** (1) |
| **Q.61** (1) | **Q.62** (3) | **Q.63** (1) | **Q. 64** (4) | **Q.65** (1) | **Q.66** (1) | **Q.67** (2) | **Q. 68** (3) | **Q.69** (2) | **Q.70** (3) |
| **Q.71** (4) | **Q.72** (4) | **Q. 73** (2) | **Q.74** (3) | **Q.75** (2) | **Q. 76** (1) | **Q.77** (2) | **Q.78** (4) | **Q.79** (1) | **Q.80** (1) |
| **Q.81** (3) | **Q.82** (4) | **Q.83** (4) | **Q.84** (4) | **Q.85** (2) | **Q. 86** (1) | **Q.87** (2) | **Q.88** (1) | **Q.89** (2) | **Q.90** (2) |
| **Q.91** (4) | **Q.92** (2) | **Q.93** (1) | **Q.94** (1) | **Q.95** (1) | **Q.96** (1) | **Q.97** (2) | **Q.98** (2) | **Q.99** (1) | **Q.100** (2) |

### BOTANY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Q.101** (3) | **Q.102** (2) | **Q.103** (4) | **Q.104** (2) | **Q.105** (1) | **Q.106** (1) | **Q.107** (4) | **Q.108** (3) | **Q.109** (3) | **Q.110** (3) |
| **Q.111** (3) | **Q.112** (3) | **Q.113** (1) | **Q.114** (2) | **Q.115** (4) | **Q.116** (1) | **Q.117** (2) | **Q.118** (3) | **Q.119** (1) | **Q.120** (1) |
| **Q.121** (2) | **Q.122** (2) | **Q.123** (4) | **Q.124** (2) | **Q.125** (1) | **Q.126** (1) | **Q.127** (3) | **Q.128** (3) | **Q.129** (1) | **Q.130** (2) |
| **Q.131** (2) | **Q.132** (4) | **Q.133** (2) | **Q.134** (2) | **Q.135** (2) | **Q.136** (3) | **Q.137** (1) | **Q.138** (3) | **Q.139** (4) | **Q.140** (3) |
| **Q.141** (3) | **Q.142** (1) | **Q.143** (4) | **Q.144** (3) | **Q.145** (3) | **Q.146** (1) | **Q.147** (3) | **Q.148** (2) | **Q.149** (3) | **Q.150** (3) |

### ZOOLOGY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Q.151** (2) | **Q.152** (4) | **Q.153** (4) | **Q.154** (2) | **Q.155** (3) | **Q.156** (1) | **Q.157** (1) | **Q.158** (1) | **Q.159** (4) | **Q.160** (4) |
| **Q.161** (4) | **Q.162** (1) | **Q.163** (1) | **Q.164** (1) | **Q.165** (2) | **Q.166** (4) | **Q.167** (4) | **Q.168** (1) | **Q.169** (2) | **Q.170** (2) |
| **Q.171** (2) | **Q.172** (4) | **Q.173** (4) | **Q.174** (3) | **Q.175** (2) | **Q.176** (4) | **Q.177** (3) | **Q.178** (4) | **Q.179** (4) | **Q.180** (4) |
| **Q.181** (3) | **Q.182** (2) | **Q.183** (2) | **Q.184** (3) | **Q.185** (1) | **Q.186** (2) | **Q.187** (4) | **Q.188** (1) | **Q.189** (2) | **Q.190** (3) |
| **Q.191** (4) | **Q.192** (3) | **Q.193** (2) | **Q.194** (1) | **Q.195** (3) | **Q.196** (1) | **Q.197** (4) | **Q.198** (3) | **Q.199** (1) | **Q.200** (3) |

### PHYSICS

**Q.1** (4)

**Q.2** (4)

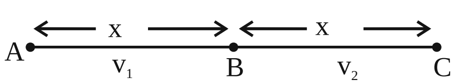
$$\vec{P}\cdot\vec{Q} = 0$$

$$\left(\hat{i} + 2m\hat{j} + m\hat{k}\right)\cdot\left(4\hat{i} - 2\hat{j} + m\hat{k}\right) = 0$$

$$\Rightarrow 4 - 4m + m^2 = 0$$

$$\Rightarrow (m-2)^2 = 0 \Rightarrow m = 2$$

**Q.3** (4)




$$\text{Average velocity} = \frac{\text{Total displacement}}{\text{Total time}}$$

$$= \frac{x + x}{\frac{x}{v_1} + \frac{x}{v_2}} = \frac{2v_1v_2}{v_1 + v_2}$$

**Q.4** (3)

**Q.5** (4)

$$\sqrt{F_2^2 + F_3^2} = 10N \Rightarrow a = \frac{10}{5} = 2\ m/s^2$$

**Q.6** (3)

$$a = \frac{v^2}{r} \quad ar = v^2 = \text{constant}$$

rectangular hyperbola

**Q.7** (4)

**Q.8** (4)

**Q.9** (3)

Radius of gyration depends only on distribution of mass.

**Q.10** **(4)**

According to Kepler's 3rd law

$$\left(\frac{T_1}{T_2}\right)^2 = \left(\frac{r_1}{r_2}\right)^3$$

$$\left(\frac{1}{T}\right)^2 = \left(\frac{R}{3R}\right)^3 = \frac{1}{27}$$

$T^2 = 27$

$T = 3\sqrt{3}$ years

**Q.11** (3)

Amplitude A = 6 cm

When particle is at x = 4 cm,

its |velocity| = |acceleration|

$$\text{i.e., } \omega\sqrt{A^2 - x^2} = \omega^2 x \Rightarrow \omega = \frac{\sqrt{A^2 - x^2}}{x}$$

$$= \frac{\sqrt{(6)^2 - (4)^2}}{4} = \frac{\sqrt{5}}{2}$$

$$T = \frac{2\pi}{\omega} = 2\pi\left(\frac{2}{\sqrt{5}}\right) = \frac{4\pi}{\sqrt{5}} = \frac{4\sqrt{2}\pi}{\sqrt{10}}$$

**Q.12** (4)

$$f_0 = \frac{v}{2L} = \frac{330}{2 \times \frac{1}{4}} = 660\text{Hz}$$

$$f = n \cdot \frac{v}{2L} \text{ where } n = 1, 2, 3, 4 \text{........}$$

**Q.13** (4)

$$\frac{\Delta U}{\Delta Q} = \frac{nC_v\Delta T}{nC_p\Delta T} = \frac{C_v}{C_p} = \frac{1}{\gamma} = \frac{10}{14} = \frac{5}{7} \approx 0.7$$

**Q.14** (1)

$$PV = \mu RT \text{ Þ } P = \mu RT \times \frac{1}{V}$$

$\Rightarrow y = mx \Rightarrow$ slope $\propto$ T

**Q.15** (4)

$$Y = \frac{F/A}{\Delta L/L} \Rightarrow F = \left(\frac{AY}{L}\right)\Delta L$$

$$\Rightarrow W = \left(\frac{AY}{L}\right)\ell \qquad \text{.....(i)}$$

$\Rightarrow$ When W & 3W attached at two ends of string then

$$\text{tension } T = \frac{2(W)(3W)}{W + 3W} = \frac{3W}{2}$$

$$\Rightarrow \frac{3W}{2} = \left(\frac{AY}{L}\right)x \qquad \text{.....(ii)}$$

By equation (i) and (ii) $x = \frac{3\ell}{2}$

**Q.16** (2)

$$\frac{\rho_{Body}}{\rho_w} = 1 - f_{out} = 1 - \frac{1}{4}$$

$$\Rightarrow \rho_{Body} = \frac{3}{4} \times 1000\frac{kg}{m^3} = 750\frac{kg}{m^3}$$

**Q.17** (4)

Electrostatic lines of force do not form closed loops, as electrostatic field is a conservative field.

**Q.18** (3)

**Conceptual**

**Q.19** (2)

Let $C_s$ is the effective capacitance.

$$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} = \frac{1}{3} + \frac{1}{6} + \frac{1}{12}$$

$$\therefore \text{ Cs} = \frac{12}{7}\mu F$$

Charge on $C_2$ = Charge on Cs

$C_2V_2 = C_sV$

$$V_2 = \frac{C_sV}{C_2} = \frac{\frac{12}{7} \times 14}{6} = 4V$$

**Q.20** (3)

**Q.21** (3)

$$\frac{R_1}{R_2} = \frac{2}{3} \qquad \text{....(i)}$$

$$\frac{R_1 + 10}{R_2} = 1$$

$$\Rightarrow R_1 + 10 = R_2 \qquad \text{....(ii)}$$

$$\frac{2R_2}{3} + 10 = R_2 \; : \; 10 = \frac{R_2}{3}$$

$$\frac{\frac{30 \times R}{30 + R}}{30} = \frac{2}{3}$$

$R = 60\,\Omega$

**Q.22** (4)

Magnetic field due to the solenoid is along its length so $\theta = 0^\circ$

$\phi = B.A.$

$= 200 \times 15 \times 10^{-4}$

$= 0.3$ Wb

**Q.23** (4)

Induced emf $e = Bvl \Rightarrow Bv(2R) = \frac{2BvL}{\pi}$

**Q.24** (2)

$$1_{rms} = \frac{E_{rms}}{1/wc} = 200\times 100\times 1\times 10^{-6} A = 20mA$$

**Q.25** (4)

The lens mirror combination behaves like a spherical mirror of which focal length $f_m$ is given as

$f_{plane} = \infty$

$f_{lens} = f$

$$\Rightarrow \frac{1}{f_m} = \frac{2}{f_{lens}} + \frac{1}{f_{plane}}$$

Using mirror formula we have

$u = +a$

$v = +\frac{a}{3}$

$$\Rightarrow \frac{1}{f_m} = \frac{1}{u} + \frac{1}{v} = \frac{1}{a} + \frac{3}{a} = \frac{4}{a} \Rightarrow \frac{a}{4} = \frac{f}{2} \Rightarrow a = 2f$$

**Q.26** (4)

The magnitying power of a telescope, is the ratio of the angular size of image to the angular size of object. For M.P = 20; the angular size of image is 20 times that of object. This will be so if the image formed is 20 times nearer than the object.

**Q.27** (1)

$$\because \frac{x}{D} = \frac{\Delta}{d} \Rightarrow x = \frac{\Delta D}{d}$$

$$d1 = \frac{7\lambda_1 D}{d} \; ; d2 = \frac{7\lambda_2 D}{d}$$

$$\frac{d_1}{d_2} = \frac{\lambda_1}{\lambda_2}$$

**Q.28** (2)

$$V = \frac{h}{e} f - \frac{\phi}{e}$$

Minimum energy for ejection = work function

$\phi = hf$ (for $v = 0$)

$$= \frac{6.62\times 10^{-34} \times 5.5\times 10^{14}}{1.6\times 10^{-19}} = 2.27\, eV$$

**Q.29** (2)

Energy levels in Hydrogen like atom is given by

$$E = -13.6 \frac{z^2}{n^2} eV$$

As $He^+$ is 1st excited state

$\therefore \quad z = 2, n = 2$

$E = -13.6\, eV$

As total energy of $He^+$ in 1st excited state is – 13.6 eV, ionisation energy should be +13.6 eV.

**Q.30** (3)

Energy is released

$\therefore (B.E.)_{product} > (B.E.)_{Reactant}$

**Q.31** (4)

Both the statements are true. To convert the pulsating voltage into steady D.C. both the methods can be implemented.

**Q.32** (2)

**Q.33** (3)

Theoritical

**Q.34** (4)

Direction of e.m wave propagation is along $\vec{E} \times \vec{B}$

**Q.35** (4)

(1) Infrared rays are used to treat muscular strain becuase these are heat rays.

(2) Radio waves are used for broadcasting because these waves have very long wavelength ranging from few centimeters to few hundred kilometers.

(3) X-rays are used to detect fracture of bones because they have high penetrating power but they can't penetrate through denser medium like dones.

(4) Ultraviolet rays are absorbed by ozone of the atmosphere.

**Q.36** (3)

**Q.37** (2)

**Q.38** (1)

Area $\propto \pi(\text{Range})^2 \propto V^4$

$$\therefore \frac{A_1}{A_2} = \left(\frac{1}{2}\right)^4$$

**Q.39** (1)

$$\sum \vec{F} = 0 \, , \; \sum \vec{\tau} = 0$$

**Q.40** (3)

$$V_T = \frac{2}{9} r^2 g \frac{(\rho - \rho')}{\eta} \propto r^2$$

$$\Rightarrow \frac{dV_T}{V_T} = 2\frac{dr}{r} = 2\times \frac{0.1}{5} \equiv 4\%$$

**Q.41** (1)
Magnitude of forces are equal (action-reaction pair)

**Q.42** (4)

**Q.43** (2)

**Q.44** (2)

$$T = \frac{\pi m}{qB}$$

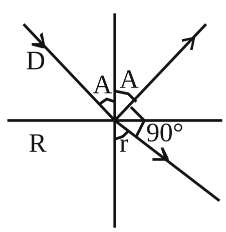
$$\frac{T_p}{T_\alpha} = \left(\frac{m_p}{m_\alpha}\right)\left(\frac{q_\alpha}{q_p}\right) = \left(\frac{1}{4}\right)\left(\frac{2}{1}\right) = \frac{1}{2}$$

**Q.45** (1)

**Q.46** (3)
Refractive index of denser medium with respect to rarer medium, $n_{12} = \frac{n_D}{n_R} = \frac{1}{\sin\theta_C}$

or $\frac{n_R}{n_D} = \sin\theta_C$ .....(i)

Using Snell's law at the interface of two media.




$n_D \sin A = n_R \sin r$

$$\frac{n_R}{n_D} = \frac{\sin A}{\sin(90 - A)} = \frac{\sin A}{\cos A} = \tan A$$

$\tan A = \sin\theta_C$; $A = \tan^{-1}(\sin\theta_C)$ [from eqn. (i)]

**Q.47** (3)
If energy of photon is doubled then $K.E._{max}$ of $e^-$ will become more then doubled.

**Q.48** (4)

Sol. $_{92}U^{238} \longrightarrow {}_{82}Pb^{206}$

Let $n_1$ be number of $\alpha$ particles and $n_2$ be the beta particles.

$_{92}U^{238} \longrightarrow {}_{82}Pb^{206} + n_1 = 8;\ 92 = 82 + 2n_1 - n_2$

$\Rightarrow n_2 = 6$

$\alpha$ particles = 8, $\beta$ = particles = 6

**Q.49** (4)

**Q.50** (1)
Putting (0,0)
$A + B = 0,$
$\overline{A + B} = 1,$
$A . B = 0,\ \overline{A + B} = 1$
For any other value $\overline{A + B} = 0$

## CHEMISTRY

**Q. 51** (2)
10 mole of $A_2B_3$ = 100 g of A and 60 g of B
1 mole of $A_2B_3$ contain = 10 g of A and 6 g of B
molecular weight of $A_2B_3$ = 16
2A = 10 g atom of A
Atomic weight of A = 5
weight of 3 g of atom B = 6

so weight of 1 atom of B = $\frac{6}{2} \times \frac{1}{N_A} = \frac{3}{N_A}$

Atomic weight of B = 3

**Q. 52** (4)
wave nature of light is given by diffraction and interference. Photoelectric effect explains particle nature of light.

**Q.53** (2)
Adiabatic process
q = 0
$\Delta U = W_{ad}$
Isobaric ($P_{const}$)
$W = -P\Delta V$
Isochoric ($V_{const}$)
$W = 0$ , $\Delta U = q$
Isothermal reversible

$$W = -nRT \ln \frac{V_2}{V_1}$$

**Q.54** (1)

$$K = \frac{[PCl_3][Cl_2]}{[PCl_5]} = \frac{2\times10^{-2} \times 3\times10^{-2}}{2\times10^{-5}} = 30$$

**Q.55** (2)
$K_1 > K_2 > K_3$
Successive dissociation constant is always smaller in polyprotic acid

**Q.56** (2)
Oxidation state of O-atom lies from – 2 to + 6

**Q.57** (2)
2 molal aqueous solution is 2mole of NaOH in 1kg of solvent ($H_2O$)

$$n_{NaOH} = \frac{2}{2+\frac{1000}{18}} = \frac{2}{57.5} = 0.035$$

**Q. 58** (2)

50 ml of 1 N NaOH is 1 M NaOH

150 ml of 2N Ca $(OH)_2$ is 1M $Ca(OH)_2$

$$\left[OH^-\right] = \frac{1\times 50 + 2(150)}{200} = \frac{350}{200}$$

$= 1.75$ m

**Q.59** (2)

$$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$$

$[Zn^{+2}] = 10[Cu^{+2}]$

$E_1 = 1.1V$

$$E_2 = E^{o}_{cell} - \frac{2.303RT}{2F}\log\frac{\left[Zn^{+2}\right]}{\left[Cu^{+2}\right]}$$

$$E_2 = E^{o}_{cell} - \frac{2.303RT}{2F}\log 10\frac{\left[Zn^{+2}\right]}{\left[Cu^{+2}\right]}$$

$$E_2 = E^{o}_{cell} - \frac{2.303RT}{2F}\log\frac{\left[Zn^{+2}\right]}{\left[Cu^{+2}\right]} - \frac{2.303RT}{2F}\log 10$$

$$E_2 = E_1 - \frac{2.303RT}{2F}$$

$$E_2 = 1.1 - \frac{2.303RT}{2F}$$

$\Delta G^o = -nFE_2$

$$= -2F\left(1.1 - \frac{2.303RT}{2F}\right)$$

$= 2.303\,RT - 2.2F$

**Q.60** (1)

In mercury cell the concentration of ion does not changes with time. So the voltage remains constant with time. So both statement are correct.

**Q.61** (1)

Order can be fractional and is experimentally determined, while molecularity is theoritical.

**Q.62** (3)

for elementary reaction, the sum of stoichiometric coefficient is order of reaction.

for zero order reaction rate and rate constant are equal.

$R = k\,[A]^0$

Zero order reaction is concentration independent.

Zero order reaction is never elementary.

**Q.63** (1)

$CH_2$–OH
|
$CH_2$–OH

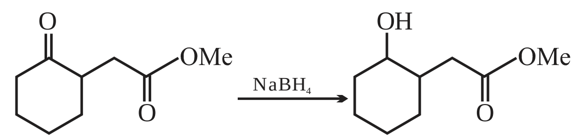
Glycol Boil at highest temperature due to presence of H-Bonding with more extent.

**Q. 64** (4)

$CH_2$–OH
|
CH–OH $\xrightarrow{HIO_4}$ 2HCHO+HCOOH
|
$CH_2$–OH

methanal formic acid

**Q.65** (1)




**Q.66** (1)

H – C(=O) – H + RMgCl $\xrightarrow{H_3O^{\oplus}}$ R – $CH_2$ – OH

1° Alcohol

$CH_3$–C(=O)–H+RMgCl $\xrightarrow{H_3O^{\oplus}}$ $CH_3$–CH(OH)–R

2′ Alcohol

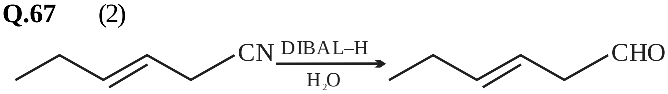
$CH_3$–C(=O)–$CH_3$+RMgCl $\xrightarrow{H_3O^{\oplus}}$ $CH_3$–C(R)(OH)–$CH_3$

3′ Alcohol

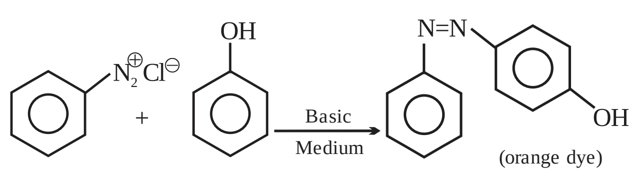
H–C(=O)–$OCH_3$+RMgCl $\xrightarrow{H_3O^{\oplus}}$ R–CH(OH)–R

2′ Alcohol

**Q.67** (2)




**Q. 68** (3)




(A)

**Q.69** (2)
Nomality of acid = 0.5 N
volume = 15 $cm^3$ = 15 ml

$$\%N = \frac{14}{1000} \times \frac{\text{volume} \times \text{normality}}{\text{mass of substance}} \times 100$$

$$\%N = \frac{14}{1000} \times \frac{15 \times 0.5}{0.75} \times 100$$

= 14%

**Q.70** (3)

$$H_2^+ \longrightarrow \sigma 1s^1$$

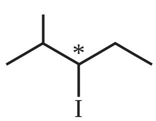
$$\text{Bond order} = \frac{1-0}{2} = 0.5$$

**Q.71** (4)
HCl does not have any H-Bonding.

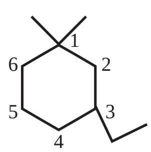
**Q.72** (4)
σ Bond can form by S–S, S–P and P–P axial overlapping.

**Q. 73** (2)
Reactivity of Halogens $F_2 > Cl_2 > Br_2 > I_2$

**Q.74** (3)




**Q.75** (2)




3-ethyl-1,1-dimethyl cyclo Hexane

**Q. 76** (1)
Reativity of Ary Halides

towards SnAr ∝ electron withdrawing groups

**Q.77** (2)
Mg > Al > Be > B

**Q.78** (4)
Statement I is false and statement II is true.
Ruby→Red colour
Emerald → green colour

**Q.79** (1)
Assertion and Reason true and R is the correct explanation of A.

**Q.80** (1)
A-ii, B-i, C-iv, D-iii

**Q.81** (3)
Magnetic moment (M) ∝ number of unpaired electrons
$Ti^{+3} \rightarrow$ 1 unpaired $e^-$
$Cr^{+2} \rightarrow$ 4 unpaired e
$Mn^{+2} \rightarrow$ 5 unpaired $e^-$
$Ni^{+2} \rightarrow$ 2 unpaired $e^-$

**Q.82** (4)
$Cr_2O_7^{2-}$ and $MnO_4^-$ is coloured due to charge transfer
$[Ti(H_2O)_6]^{3+}$ is coloured due to CFT.

**Q.83** (4)
$[Pt(en)_2(SCN)_2]^{2+} \rightarrow$ Bis (ethylenediamine) dithiocyanato platinum (N)

**Q.84** (4)
COO is given Blue colour in Bead Test.

**Q.85** (2)
T*l* > In > A*l* > Ga

**Q. 86** (1)

**Q.87** (2)
Sucrose is a non reducing sugar.

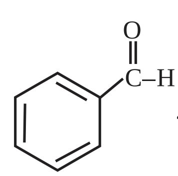
**Q.88** (1)
Electron gain enthalpy → S > Se > Te > O

**Q.89** (2)
$-NO_2$ is always considered as prefix substituent not as principal functional group.

**Q.90** (2)

$$CH_4 + O_2 \xrightarrow{MO_2O_3/\Delta} HCHO$$

**Q.91** (4)



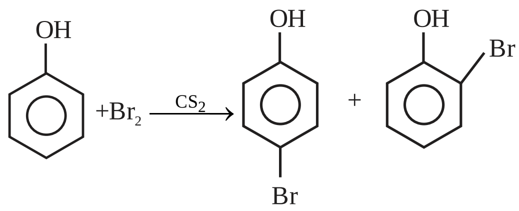

4π-Bonds

**Q.92** (2)

$$R-CH\begin{matrix} X \\ X \end{matrix} \xrightarrow{H_3O^{\oplus}} R-CH\begin{matrix} OH \\ OH \end{matrix}$$

$$\xrightarrow[-H_2O]{} R-CHO \text{ Aldehydes}$$

**Q.93** (1)



**Q.94** **(1)**

At Belong to Halogen family.

**Q.95** (1)

**Q.96** (1)

When $E_{ext} < 1.1$ V the electron flow from zinc to copper and at $E_{ext} = 1.1$ V no current flows.

**Q.97** (2)

$H_3PO_3$ has P in (+3) state which can be disproponate into +5 and +1, 0, –1, –3.

**Q.98** (2)

$2A + B \rightleftharpoons C + 2D$ $K_1$ ...... (i)

$C + D \rightleftharpoons B + E$ $K_2$.......(ii)

$2A + C \rightleftharpoons B + 2E$

to obtain this equation

(1) + (2) × 2

$K = K_1.K_2^2$

**Q.99** (1)

Bomb calorimeter at constant volume, so $q = \Delta u$

**Q.100** (2)

$H_2Te$ due to large bond length.