Solution

ANS -① A, B, C, D fact

ANS -② A, B, C, D

(A) It will be dumb-bell shape.

(B) There is one spin quantum no value. i.e. $\frac{1}{2}$.
There are two spin values.

(C) For unielectron system
$3s = 3p = 3d$.

(D) Energy depends on azimuthal quantum no and principle quantum no.

ANS -③ C

(A) degenerate orbitals will not radiate photon.

(B) screening effect
$s > p > d > f$.

(C) fact

ANS -④ A, B, D fact.

ANS ⑤ No. of electrons in $M^+ = 18$
No. of electrons in $M = 19$
No. of protons in $M = 19$
No. of neutrons in $M = 20$
mass no $= 19 + 20$
$= 39$.

ANS (6)

(A) No. of maxima $= n - \ell$

(B) no. of Radial Nodes $= n - \ell - 1$

(C) r_{max} increases when ℓ decreases.

ANS (7) A, B, C

(A) $n_{O_2} = \frac{1}{32}$ $\quad n_{SO_2} = \frac{2}{64} = \frac{1}{32}$

(B) $n_{CO_2} = \frac{1}{44}$ $\quad n_{N_2O} = \frac{1}{44}$

(C) $n_{O_2} = 0.005$ mole $\quad n_{He} = 0.005$ mole

(D) $n_{O_2} = \frac{1}{32}$ $\quad n_{O_3} = \frac{1}{48}$

ANS (8).

(A) $3Cu + 8HNO_3 \longrightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$

(B) $Al_2O_3 + 6HNO_3 \longrightarrow 2Al(NO_3)_3 + 3H_2O.$

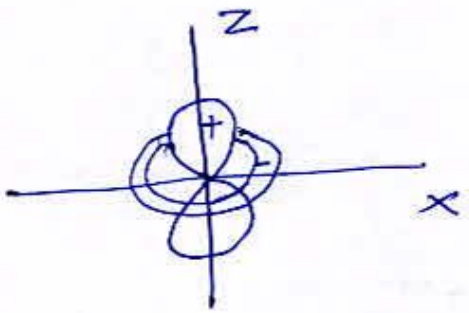
(C) $4Zn + 10HNO_3 \longrightarrow Zn(NO_3)_2 + NH_4NO_3 + H_2O$

(D) $Cu + 4HNO_3 \longrightarrow Cu(NO_3)_2 + 2NO_2 + 2H_2O.$

ANS (9) (A).

ANS-10 (B), (C).

$3d_{z^2}$ Radial Nodes = 0



ANS-11 (C)

(A) $d^{10}s^1$ and d^9s^2 configuration will have same no. of exchange pairs.

ANS-(12)

$E = E_0 + KE$

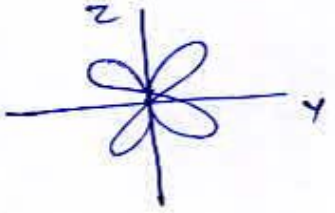
(B) If energy of incident radiation is greater than E_0 photoelectric effect will occur.
If $E < E_0$ it will not occur.

(D) If wavelength is doubled energy of incident Radiation will be halved hence stopping potential will decrease.

ANS (13) A, B, C, D.

ANS (14) A, B

d_{xy}



d_{yz}.

ANS (15) B, C, D.

ANS (16) A, B, C

(A) $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

(B) $\frac{P_1}{300} = \frac{P_2}{310}$

(C) $n_f = n_1 + n_2$

$P_f \times V_f = P_1 V_1 + P_2 V_2$

$P_f \times 15 = 5 \times 9 + 6 \times 10$

$P_f = \frac{45+60}{15} = 7 \text{ atm}$

(D) $NO_2 + CO$

70ml 30ml

$2NO_2 \longrightarrow N_2O_4$

$70 - 2x \qquad x$

$30 + 70 - 2x + x = 80$

$x = 20$

$X_{NO_2} = \frac{30}{80} = \frac{3}{8}$.

ANS (17) (A), (D)

Ans - 18

(A) $V = \frac{1}{275} \times 3 \times 10^8$

$= 1.09 \times 10^6$

$1.09 \times 10^6 = 2.18 \times 10^6 \times \frac{Z}{n}$

$n = 2$

(B) $\bar{\nu} = R_H \times 1^2 \left[\frac{1}{1^2} - \frac{1}{2^2}\right]$

$= \frac{3R_H}{4}$

(C) $2\pi r = n\lambda$

$\lambda = \pi \times 0.529 \times \frac{n^2}{2}$ Å

$= 6.64$ Å

(D) $\nu = 6.6 \times 10^{15} \times \frac{Z^2}{n^3}$

Ans - 19

(A) % of water vapour $= \frac{15}{760} \times 100$

$= 1.97\%$

(B) % of $N_2 = 98.02\%$

(C) $PV = nRT$

(D) false

ANS (20). B, C.

valve 3 will be open first then valve II will be opened.

ANS (21). $\frac{R_{He}}{R_{CO}} = \sqrt{\frac{28}{4}} = \sqrt{7}$

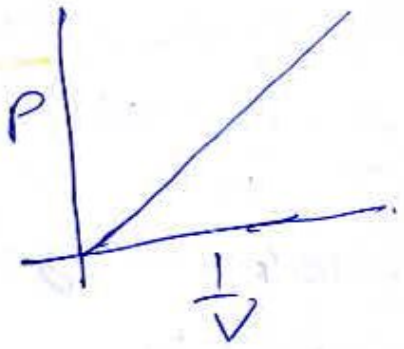
$\frac{R_{He}}{R_{CO_2}} = \sqrt{\frac{44}{4}} = \sqrt{11}$

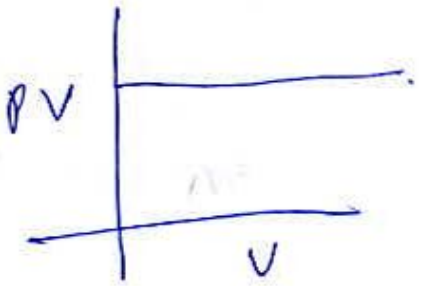
$\frac{R_{He}}{R_{SO_2}} = \sqrt{\frac{64}{4}} = 4.$

ANS (22). (A)

ANS - (23). B Fact

ANS - (24). A, B, C





ANS - (25). A, B

(A) $\frac{P_1}{T_1} = \frac{P_2}{T_2}$.

(B) $\frac{V_1}{T_1} = \frac{V_2}{T_2}$.

(C) $n_{O_2} = n_{SO_2}$.

(D) $\frac{4}{3}\pi R^3 =$ Volume of one molecule.

Integer

Ans-(26) $N \longrightarrow NH_3 \xrightarrow{HCl.} NH_4Cl$

mole of HCl = mole of NH_3 = mole of N

$$\text{Moles of N} = \frac{24.61 \times 0.1181}{1000}$$

$$= 2.9064 \times 10^{-3} \text{ mole.}$$

$$\% N = \frac{2.9064 \times 10^{-3} \times 14}{1.0175} \times 100$$

$$= 4\%.$$

ANS (27)

$$W_1 d_1 V_1 = W_2 d_2 V_2.$$

$$V_1 = \frac{69.8 \times 1.42 \times 50}{19 \times 1.304}$$

$$= 200 \text{ ml.}$$

$$= 100 \times 2 \text{ ml.}$$

ANS 29.

$$\text{No. of C atoms} = \frac{2}{12} \times N_A$$

$$F = K \times \frac{q_1 q_2}{r^2}$$

$$1 \times 10^{-5} = 9 \times 10^9 \times \frac{q^2}{(10^{-2})^2}$$

$$\text{ratio} = \frac{1}{4.8} \times 10^{-13}.$$

ANS-29

$$\text{molarity of sea water} = \frac{1000 w_1 d}{(w_1 + w_2) m_1}$$

$$= \frac{1000 \times 2.8 \times 1.03}{100 \times 58.3}$$

$$= 0.493 \text{ M}$$

$$M_1 V_1 = M_2 V_2$$

$$0.493 \times 10^6 = 5.45 \times V_2$$

$$V_2 = 90.475 \text{ litre.}$$

volume evaporated

$$= 9 \times 10^5$$

$$\boxed{x = 9}$$

ANS (30) (3) $r^2 - 5r + 6 = 0$

$r^2 - 3r - 2r + 6 = 0$

$r(r-3) - 2(r-3) = 0$

$r = 2$

$r = 3$

3s orbital.

$A = 3$, $B = 0$, $C = 0$, 0.

$D = 3$. 3s & 3p.

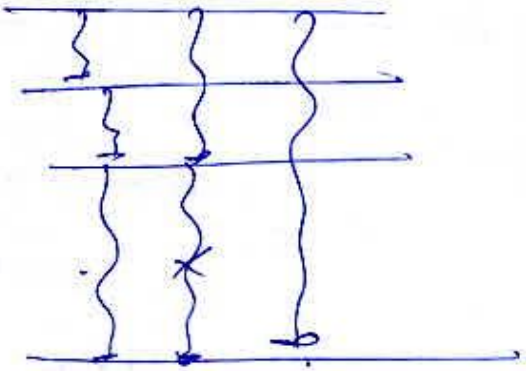
3s 3p, 3d, 3f

$E = 0$

$F = 3$

$B + D + F = 0 + 3 + 3 = 6$ / $A + C + E = 3 + 0 + 0 = 3$.

ANS (31) · (5) ·



ANS (32) ·

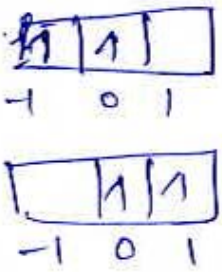
$He^{+}_{6\to4}$, $He^{+}_{7\to4}$ will be in visible Range.

ANS (33) ·

		unpaired e⁻
$Fe \to$	$[Ar]\ 4s^2\ 3d^6$	4
$Fe^{2+} \to$	$[Ar]\ 4s^0\ 3d^6$	4
$Co \to$	$[Ar]\ 4s^2\ 3d^7$	3
$Co^{3+} \to$	$[Ar]\ 4s^0\ 3d^6$	4
$Al \to$	$[Ne)\ 3s^2\ 3p^1$	1
$Mg \to$	$[Ne)\ 3s^2$	0
$Ni^{2+} \to$	$[Ar]\ 4s^0\ 3d^8$	2
$Sc^{3+} \to$	$[Ar]\ 4s^0\ 3d^0$	0
$Sc \to$	$[Ar]\ 4s^2\ 3d^1$	1
$N \to$	$1s^2\ 2s^2\ 2p^3$	3
$V \to$	$[Ar]\ 4s^2\ 3d^3$	3

ANS - (34).

$C \rightarrow 1s^2\ 2s^2\ 2p^2$ 1 e^-.



max.

min = 0.

$l = 1$

$m = 1$

$Na \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^1$

2 e^- max.

2 e^- = min

$3 - 2 = 1$

ANS - (35)

$13.6 \times \frac{96}{100} = 13.056.$

$(n = 5)$.