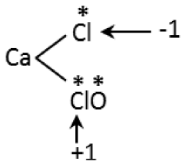
XI - CHEMISTRY - SOLUTIONS

31. **c)** 0, –1

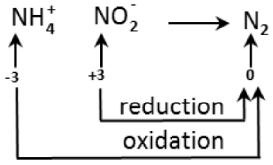
32. **b)** –1 on Cl* and +1 on Cl**



33. **a)** –1

$\overset{III}{Fe}\ \overset{II}{[Fe(CN)_6]}\ (+3+2-6=-1)$

34. **b)** Oxidation number of N in NH_4^+ changed from –3 to 0 and that in NO_2^- changed from + 3 to 0



35. **c)** It is intramolecular redox reaction.

36. **d)** 6 moles of Fe^{2+}

$$\underset{1mol}{Cr_2O_7^{2-}} + \underset{6mol}{6Fe^{2+}} + 14H^+ \rightarrow 2Cr^{4+} + 7H_2O + 6Fe^{3+}$$

37. **a)** -1 and species is superoxide

As given reaction is balanced from charge balance we get X = –1, O.N. of O = $-\frac{1}{2}$

38. **c)** $5I^- + IO_3^- + 6H^+ \rightarrow 3I_2 + 3H_2O$

39. **b)** 0.10 mol of NaOH

$$\underset{0\cdot05}{Ca(OH)_2} \rightarrow Ca^{2+} + \underset{0.1\equiv 0.1 mole\ of\ NaOH}{2OH^-}$$

40. **c)** $Mn^{2+}, MnO_4^{2-}, MnO_2$

$MnO_4^- \xrightarrow{+5e^-} Mn^{2+}$ $\quad E = \frac{M}{5}$

$MnO_4^- \xrightarrow{+e^-} MnO_4^{2-}$ $\quad E = M$

$MnO_4^- \xrightarrow{+3e^-} MnO_2$ $\quad E = \frac{M}{3}$

41. **b)** CH_3OH

42. **c)** $\frac{M}{28}$

43. **b)** 1.2 L

44. **c)** +1

45. **b)** 2

$\overset{+3}{Bi^{3+}} \rightarrow \overset{+5}{BiO_3^-}$

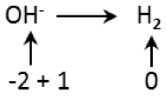
Change in oxidation number = 2 units

Thus, number of equivalents in one mole $Bi^{3+} = 2$

46. **d)** $I^-(aq) + IO_3^-(aq) \rightarrow IO_3^-(aq)$

	Reaction	Change in O.N.	Number of equivalent
(a)	$VO^{2+}(aq) \rightarrow V^{3+}(aq)$; $x-2=+2$, $x=+4$; $+3$	1 unit	1
(b)	$NO_3^-(aq) \rightarrow NO_2(g)$; $+5$, -4	1 unit	1
(c)	$VO_6^{5-}(aq) \rightarrow V^{2+}(aq)$; $+5$, $+2$	3 unit	3
(d)	$IO_3^-(aq) \rightarrow I_3^-(aq)$; $+5$, $-\frac{1}{3}$	$\frac{16}{3}$	$\frac{16}{3}$

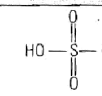
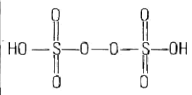
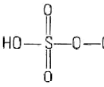
47. **b)** OH^-



Thus OH^- is reduced to H_2

48. **c)** Both are true

(c)

	Acid	Structure	Oxidation number of sulphur	Peroxy linkage
I.	H_2SO_4 sulphuric acid		+6	No
II.	$H_2S_2O_8$ peroxydi-sulphuric acid		+6	Yes
III.	H_2SO_5 peroxy-sulphuric acid		+6	Yes
IV.	$H_2S_2O_3$ thiosulph-uric acid		+2 0	No
V.	$H_2S_2O_7$ (oleum)	SO_3 dissolved in H_2SO_4	+6	No

49. **b)** $A_3(BC_4)_2$
Compound formed from A, B and C is that for which sum of oxidation number is zero. Try one by one, we find

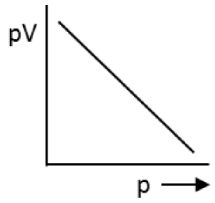
$A_3 \quad (B \quad C_4)_2$ correct
$\uparrow \quad \uparrow \quad \uparrow$
$+6 + (5 - 8)_2 = 6 + (-3)_2 = 0$

50. **a)** -1
O_2^{2-} (peroxide)
$2x = -2$
$x = -1$

51. **c)** 0.16 g

52. **a)** five times as heavy as O_2

53. **c)**



54. **b)** 0.4 atm
It will burst when volume is just larger than 20 L $p_1V_1 = 10$ L atm, $V_2 > 20$L

	p_2	V_2
a)	0.5 atm	20 L
b)	0.4 atm	25 L $(>20L)$
c)	0.7 atm	14.28 L
d)	0.8 atm	12.5 L

55. **d)** 1/ 2

$$\frac{r_x}{r_{O_2}} = \sqrt{\frac{M(O_2)}{M(X)}} = \sqrt{\frac{32}{128}} = \frac{1}{2}$$

56. **c)** 45.0 atm

$$\frac{p_1V_1}{T_1} = \frac{p_2V_2}{T_2}$$

$$\frac{5 \times V_1}{273} = \frac{p_2 \frac{V_1}{3}}{819}$$

$p_2 = 45$ atm

57. **b)** 0.7

$$p = \frac{n}{V}RT = \frac{w}{mV}RT = \frac{dRT}{m}$$

$\therefore$ m(molar mass of mixture =

$$\frac{dRT}{p} = \frac{1 \cdot 40 \times 0 \cdot 0821 \times 273}{1}$$

$= 31.38$ g mol^{-1}
Let mixture contains x part N_2 and $(1 - x)$ part Ar.

$$\therefore 31 \cdot 38 = \frac{m_1x + m_2(1-x)}{x + (1-x)}$$

$$31 \cdot 38 = \frac{28 + 40(1-x)}{1}$$

$\therefore \quad x = 0.72$

58. **d)** 20
Total pressure = 750 Torr
p_{H_2} pressure = 150 Torr

$\therefore$ mole fraction of $H_2 = \frac{150}{750} = 0 \cdot 2$

$\therefore$ Volume per cent = 20

59. **c)** $T_1 > T_2 > T_3$
At constant pressure (parallel to V-axis)

$$V_1 > V_2 > V_3$$

Since $V \propto T$, hence $T_1 > T_2 > T_3$

60. **d)** $\frac{1 \times 0.0821 \times 300}{10}$ atm

$$N_2 + 3H_2 \rightarrow 2NH_3$$

taken 1 4 0
reacts 1 3
H_2 left = 1 mol
NH_3 formed = 2 mol
But NH_3(g) dissolves in water forming NH4OH. Residual gas is only H_2 which exerts pressure.
Volume = 15 – 5 = 10 L (5 L is occupied by H_2O added)

$$\therefore \quad p = \frac{n}{V}RT = \frac{1 \times 0 \cdot 0821 \times 300}{10} \text{atm}$$