# CHEMISTRY

**31. (b)**

It is obvious

$$C_xH_y + \left(\frac{y}{4}+x\right)O_2 \longrightarrow x\,CO_2 + \frac{y}{2}H_2O$$

$$15x\ mL \quad \left(x+\frac{y}{4}\right)15\ mL \quad 15x\ mL$$

volume of oxygen used = $375 \times \frac{20}{100} = 75$ mL.

volume of air which is not reacted = 300 mL.

Total volume of gaseous = vol. of $CO_2$ + vol. of air which is not reacted = 330 mL.

thus vol. of $CO_2$ = 30 mL

thus x = 2, y = 12

**32. (c)**

Let no. of moles of gas in left bulb = $n_1$

and no. of moles of gas in right bulb = $n_2$

Since both bulb contain same no. of moles initially therefore $n_1 = n_2$

pv = nRT

$$n = \frac{PV}{RT}$$

$$n_1 = \frac{P_iV}{RT_1},\ n_2 = \frac{P_iV}{RT_1}$$

Therefore total no. of moles $(n_1 + n_2) = 2\frac{P_iV}{RT_1}$

after heating the left bulb

$$n_1 = \frac{P_fV}{RT_2},\ n_2 = \frac{P_fV}{RT_1};\quad n_1 + n_2 = \frac{P_fV}{RT_2} + \frac{P_fV}{RT_1}$$

$$\text{or}\quad 2\frac{P_iV}{RT_1} = \frac{P_fV}{R}\left(\frac{1}{T_2}+\frac{1}{T_1}\right)$$

$$\text{or}\ 2\frac{P_i}{T_1} = P_f\left(\frac{T_1+T_2}{T_1T_2}\right)$$

$$\text{or}\ P_f = 2P_i\left(\frac{T_2}{T_1+T_2}\right)$$

**33. (d)**

$$\lambda = \frac{h}{mv} \text{ or } \frac{h}{\lambda} = mv$$

$$\frac{1}{2}mv^2 = eV$$

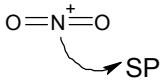
$$\text{or}\ \frac{1}{2}m^2v^2 = eV$$

$(mv)^2 = 2meV$

$mv = \sqrt{2meV}$

**34. (a)**

$NO_2^+$



**35. (d)**

$C + O_2 \rightarrow CO_2 \quad \Delta_C H = -393.5\,kJ\,mol^{-1}$ ...(1)

$CO + \frac{1}{2}O_2 \rightarrow CO_2 \quad \Delta_C H = -283.5\,kJ\,mol^{-1}$ ...(2)

(1) — (2)

$C + \frac{1}{2}O_2 \rightarrow CO$

$\Delta_f H = \{-393.5 - (-283.5)\}$ kJ mol$^{-1}$

$= -393.5 + 283.5$

$= -110$ kJ mol$^{-1}$

**36. (c)**

$n_{C_6H_{12}O_6} = \frac{18}{180} = 0.1$

$n_{H_2O} = \frac{178.2}{18} = 9.9$

$p_{H_2O} = X_{H_2O} \times 760$ mm

$= \frac{9.9}{0.1 + 9.9} \times 760mm$

$= 752.4$ mm

**37. (c)**

$A + B \rightleftharpoons C + D$

Initially 1M 1M 1M 1M

At eqb. (1–a) (1–a) (1+a) (1+a)

$Kc = \frac{[C][D]}{[A][B]}$

or $100 = \frac{(1+a)(1+a)}{(1-a)(1-a)}$

or $100 = \frac{(1+a)^2}{(1-a)^2}$

or $\sqrt{100} = \frac{1+a}{1-a}$

or $10 = \frac{1+a}{1-a}$

or $10 - 10a = 1 + a$

or $11a = 9$

$a = \frac{9}{11} = 0.818$. Thus at eqb. $[D] = 1 + a$

$= 1 + 0.818 = 1.818$

**38. (d)**

**39. (b)**

For first order reaction

$k = \frac{2 - 303}{t}$ by $\frac{[A]_0}{[A]_t}$

T = 50 min

$[A]_0 = 0.5$ M

$[A]_t = 0.125$ M

$k = \frac{2.303}{50} \log \frac{0.5}{0.125} = \frac{2.303}{50} 2 \log 2$

$= \frac{2.303}{50} \times 2 \times 0.3010$

$= 0.02772812$

$2H_2O_2 \rightarrow 2H_2O + O_2$

$\frac{\Delta[H_2O_2]}{\Delta T} = k [H_2O_2]$

$= 0.02772812 \times 0.05$

$= 1\ 3.64 \times 10^{-4}$

rate of formation of $O_2 = \frac{\Delta[O_2]}{\Delta t}$

$= \frac{-1}{2} \frac{\Delta[H_2O_2]}{\Delta T}$

$= \frac{1}{2} \times 13.64 \times 10^{-4}$

$= 6.8 \times 10^{-4}$

**40. (c)**

**41. (d)**

Generally elements of group first has lowest value of ionization energy. Sc has higher value of ionization energy.

**42. (c)**

Sulphide ores are concentrated by froth floation method so Galena (PbS) is concetrated by this method.

**43. (c)**

**44. (d)**

Li reacts with $O_2$ to from oxide $Li_2O$, Na reacts with $O_2$ to from peroxide $Na_2O_2$ and all other alkali metals reacts with $O_2$ to from superoxide.

**45. (a)**

$4Zn + 10\ NHO_3\ (dilute) \rightarrow 4\ Zn\ (NO_3)_2 + 5H_2O + N_2O$

$Zn + 4HNO_3\ (conc.) \rightarrow Zn\ (NO_3)_2 + 2\ H_2O + 2\ NO_2$

**46. (a)**

orthophospherous acid

$H_3PO_3$

$3 + n - 6 = 0$

$n = +3$

pyrophospherous acid

$H_4P_2O_5$

$4 + 2n - 10 = 0$

$n = +3$

**47. (b)**

$[Cr(H_2O)_6]^{2+} \Rightarrow Cr^{2+}$ , $[Ar]3d^4$

Four unpaired $e^-S$

$[Fe(H_2O)_6]^{2+} \Rightarrow Fe^{2+}$, $[Ar]3d^6$

Four unpaired $e^-S$

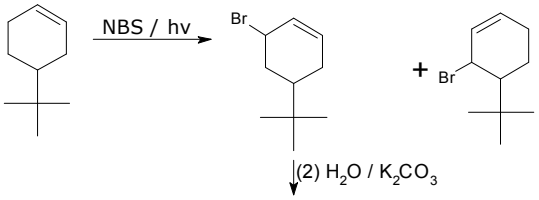
**48. (b)**

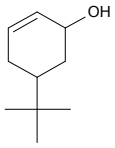
**49. (b)**

**50. (c)**

**51. (d)**

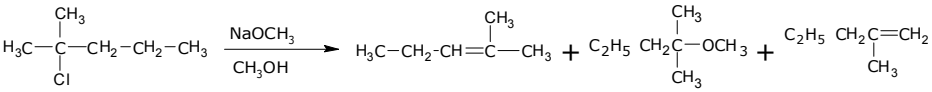
**52. (d)**



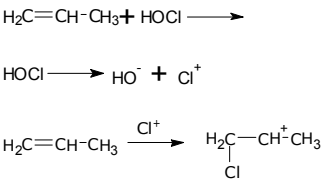




**53. (b)**

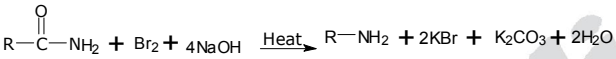
**54. (a)**




**55. (b)**




**56. (d)**




**57. (d)**

**58. (c)**

**59. (b)**

**60. (b)**