CHEMISTRY

51. (4)

$k = Ae^{-\frac{E^0}{RT}} \log_y K = \log_c A - E^o_{mx}/RT$

$\therefore \log k \text{ vs } \frac{1}{T}$.

52. (2)

Rate of formation of NH_3 (r_f) = 2 × rate of disappearance of nitrogen (r_d)

$r_{f(NH_3)} = \frac{2}{3}$ × rate of disappearance of Hydrogen (H_2)

$\therefore -\frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

53. (2)

Rate of formation of B = $\frac{2}{3}\times$ rate of disappearance of A

$\therefore +\frac{d[B]}{dt} = -\frac{2}{3}\frac{d[A]}{dt}$

54. (4)

In the given rate law

Rate = $[A]'[B]^2$

Power of [A] = 1 and [B] = 2

So overall order = 1 + 2 = 3

With respect to [A] order = 1

With respect to [B] order = 2

55. (4)

For first of order reaction Rate = k[A]

Rate constant $(k) = \frac{Rate}{[A]}$

$= \frac{7.5\times10^{-4} molL^{-1}s^{-1}}{0.2 mol.L^{-1}} = 3.75 \times 10^{-3}\ s^{-1}$

56. (4)

For first order reaction,

$k = \frac{2.303}{t}\log\frac{a}{a-x}$

Here a = initial concentration

(consider 100 moles)

a – x = final concentration

(after 75% completion

a – x = 100 – 75 = 25

$t_{75\%} = 32\ min$

$\therefore\ k = \frac{2.303}{32}\log\frac{100}{25}$

$k = \frac{2.303}{32} 2\log 2$

$k = \frac{2.303\times2}{32}\times0.3010$

$k = \frac{1.386}{32} = 0.0433\ min^{-1}$

For first order reaction

$t_{\frac{1}{2}} = \frac{0.693}{k} = \frac{0.693}{0.0433} = 16\ min$

57. (2)

$r = k'[O_3][O] = \frac{k'k''[O_3][O_3]}{[O_2]} = k[O_3]^2[O_2]^{-1}$

58. (4)

$E_a \propto \frac{1}{\text{Rate of reaction}}$

(here E_a is Activation Energy)

59. (2)

Rate of formation H_2O = $\frac{6}{4}\times$

Rate of disappearance of NO

$= \frac{6}{4}\times3.610^{-3} = 5.4 \times 10^{-3}\ mol\ L^{-1}\ s^{-1}$

60. (1)

To find the rate observe the data from experiment 1 and 2 it is observed that rate increases 4 times by doubling the concentration of A without any change in concentration of B

From experiment 2 and 3 it is observed that rate remains same even though concentration of ‘B’ doubled by keeping concentration of ‘A’ as constant i.e. rate is independent of concentration of ‘B’

So, rate = $k[A]^2$

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