## Rate law and Rate constant

**97.** (b) $r = k(C_A)^{\frac{3}{2}}(C_B)^{-\frac{1}{2}}$

Order = $\frac{3}{2} + \left(-\frac{1}{2}\right) = \frac{2}{2} = 1$

**98.** (c) If rate= $K(A)^m(B)^n$, then order of reaction $= m + n$.

**99.** (a) $k = \frac{0.693}{t_{\frac{1}{2}}} = \frac{0.693}{100 sec^{-3^{-1}}}$

**100.** (c) $t_{\frac{1}{2}} = \frac{0.693}{k}$

**101.** (b) $t_{\frac{1}{2}} = \frac{0.693}{k}, k = \frac{0.693}{480} = 1.44 \times 10^{-3}\, sec^{-1}$ .

**102.** (d) $r = k(A)^2$, when concentration is doubled
$r = k(2A)^2 = k4(A)^2$ the rate becomes 4 times.

**103** (c) $r = K[FeCl_3]^2[SnCl_2]^1$. Order $= 2 + 1 = 3$

**105.** (a)$t_{\frac{1}{2}}$ for I order reaction independent of initial concentration.

**107.** (a)The rate will be given by slowest step. Thus $r = K[A][B_2].K_c = \frac{[A][A]}{[A_2]}$or $[A] = [K_c]^{\frac{1}{2}}[A_2]^{\frac{1}{2}}$

$r = K \times [K_c]^{\frac{1}{2}}[A_2]^{\frac{1}{2}}[B_2] = K[A_2]^{\frac{1}{2}}[B]$. Thus order is $0.5 + 1 = 1.5$

**108.** (b)For I[st] order reaction half life is independent of concentration.

**110.** (b) Rate = $K[A]^{\frac{1}{2}}[B]^{\frac{3}{2}}$

$\therefore O.R. = \frac{1}{2} + \frac{3}{2} = \frac{4}{2} = 2$

**112.** (d) The rate of this photochemical reaction is independent of the concentration, therefore, it is zero order reaction.

**113.** (b) $t_{\frac{1}{2}} = \frac{0.693}{k} = \frac{0.693}{0.6932 hr^{-1}} = 1hr.$

**114.** (b) The unit of rate constant shows that reaction is of first order. For first order reaction, half life is independent of initial conc. of the reactant. Thus,

$t_{\frac{1}{2}} = \frac{0.693}{0.69\times10^{-1}} = \frac{0.693\times60}{0.69\times10^{-1}} = 600sec$

**115.** (d) *Given* : Rate constant of the first order reaction $(K) = 3 \times 10^{-6}$per sec and initial concentration $[A] = 0.10M$. We know that initial rate constant $K[A] = 3 \times 10^{-6} \times 0.10 = 3 \times 10^{-7} ms^{-1}$.

**116.** (d) It is the characteristic of pseudo-unimolecular reactions.

**117.** (b) It is a second order reaction.

**118.** (d) $r = K$ [reactant]

$\therefore \boldsymbol{K = \frac{1.0\times10^{-2}}{0.2} = 0.05}$

$\boldsymbol{t_{\frac{1}{2}} = \frac{0.693}{0.05} = 13.86s}$