Daily Tutorial Sheet 1	JEE Main (Archive)

1.(A) $k = \frac{dx}{dt[A]}$ for I order; unit $= sec^{-1}$ $\Rightarrow$ $k = \frac{dx}{dt}$ for zero order; unit $=$ Mol litre^{-1} sec^{-1}

2.(A) Sum of powers raised on concentration terms to express rate equation.

3.(D) Rate of appearance of $HI = \frac{1}{2}\frac{d[HI]}{dt}$; Rate of formation of $H_2 = \frac{-d[H_2]}{dt}$

Rate of formation of $I_2 = \frac{-d[I_2]}{dt}$

$\therefore$ $\frac{-d[H_2]}{dt} = -\frac{d[I_2]}{dt} = \frac{1}{2}\frac{d[HI]}{dt}$ or $-\frac{2d[H_2]}{dt} = -\frac{2d[I_2]}{dt} = \frac{d[HI]}{dt}$

4.(A) R is molar gas constant, A is frequency factor, k is rate constant.

5.(D) $r = k\,[A]^n\,[B]^m$

$r' = k\left(2[A]\right)^n\left(\frac{[B]}{2}\right)^m = k\,[A]^n\,[B]^m \times 2^{n-m}$ $\Rightarrow$ $r' = 2^{n-m}.\,r$

6.(D) The concentration of reactant decreases from 0.8 to 0.4 in 15 minutes.

$\therefore$ $t_{1/2} = 15\,min$

To decrease the concentration from 0.1 to 0.025, we need two half lives i.e., 30 minutes.

7.(A) $\Delta H = E_f - E_b$; For ΔH = Positive, $E_b < E_f$

8.(A) For a unimolecular reaction only one reactant is involved.

9.(B) $k = \frac{2.303}{t}\log\frac{a}{a-x}$

or $k = \frac{2.303}{t_{1/4}}\log\frac{4a}{3a} = \frac{2.303}{t_{1/4}}\log\frac{4}{3}$ or $k = \frac{2.303 \times 0.125}{t_{1/4}} = \frac{0.29}{t_{1/4}}$

10.(C) $R \propto [W]^2$ $\Rightarrow$ $R' \propto [2CO]^2$ $\Rightarrow$ $R \propto 4[W]^2$ $\Rightarrow$ $R' = 4R$

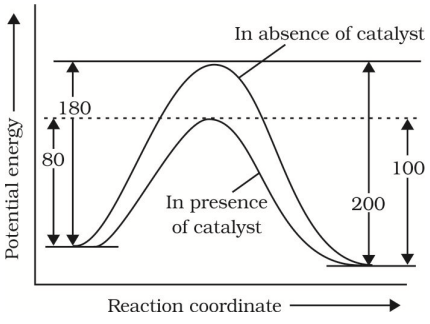
11.(B) E is activation energy.

12.(D) $NO(g) + Br_2(g) \rightleftharpoons NOBr_2(g)$ $\Rightarrow$ $NOBr_2(g) + NO(g) \longrightarrow 2NOBr(g)$

$R = k[NOBr_2][NO] = k.K_C[NO][Br_2][NO]$, where $K_C = \frac{[NOBr_2]}{[NO][Br_2]} = K'[NO]^2[Br_2]$

13.(A) When conc. of B is doubled, the half life did not change, hence reaction is of first order w.r.t. B. When concentration of A is doubled, reaction rate is doubled, hence reaction is of first order w.r.t. A. Hence over all order of reaction is 1 + 1 = 2. So, unit of rate constant is mol^{-1} lit s^{-1}.

14.(D)



So, $\Delta H_{reaction} = E_f - E_b = 80 - 100 = -20\,kJ\,mol^{-1}$

15.(B) $\frac{1}{2}A \longrightarrow 2B$

$\frac{-2d[A]}{dt} = +\frac{d[B]}{2dt}$ $\Rightarrow$ $\frac{-d[A]}{dt} = \frac{1}{4}\frac{d[B]}{dt}$