→ Zero order rxn:

• Decomposition of ~~solid compound~~ gas on solid catalyst at high conc. is zero order rxn.

→ *Integrated rate eqn:

$(A) \rightarrow A \longrightarrow$ products ; $\boxed{n=0}$

At $t=0$: $[A]_0 = a$. —

$t=t$: $[A]_t = a-x$ x.

$[A]_0$ – initial conc. of

$[A]_t$ – conc. remainin after time t

$$\text{Rate} = -\frac{d[A]_t}{dt} = k[A]_t^0$$

$$\boxed{k = \frac{[A]_0 - [A]_t}{t}} = \frac{a-(a-x)}{t} = \frac{x}{t}$$

• Half-life:

If $t = t_{1/2}$, $[A]_t = \frac{[A]_0}{2}$

$$k = \frac{[A]_0 - \frac{[A]_0}{2}}{t_{1/2}}$$

$$t_{1/2} = \frac{[A_0]}{2K}$$

$$t_{1/2} \propto [A]_0$$

- Time taken for completion : t_∞.

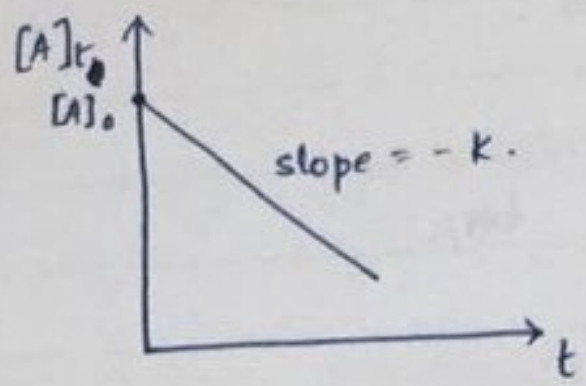
If $t = t_\infty$

$[A]_{t=\infty} = 0$.

$$R = \frac{[A_0] - [A]_t}{t} \Rightarrow k = \frac{[A]_0}{t_\infty}$$

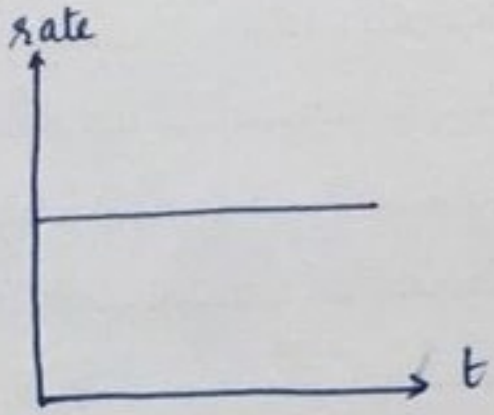
$$t_\infty = \frac{[A_0]}{k}.$$

→ For zero order:

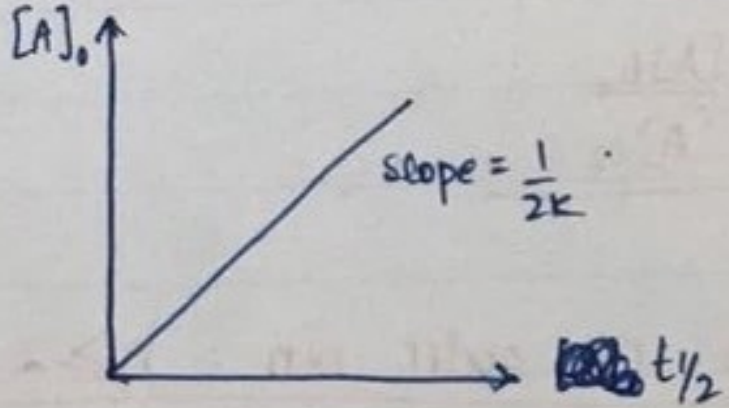


$$k = \frac{[A]_0 - [A]_t}{t}$$

$$[A]_t = -kt + [A]_0$$

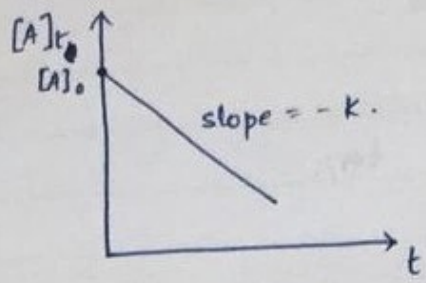


$$\text{rate} = k.$$



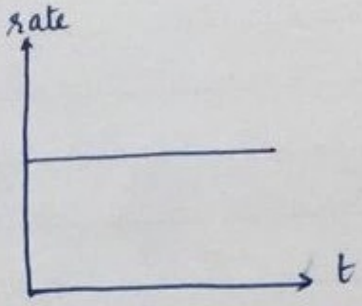
$$t_{1/2} = \frac{[A]_0}{2k}$$

→ For zero order:

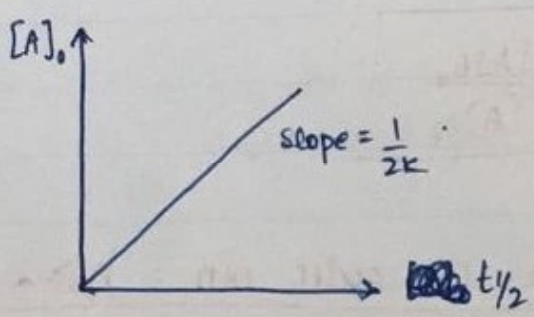


$$k = \frac{[A]_0 - [A]_t}{t}$$

$$[A]_t = -kt + [A]_0$$

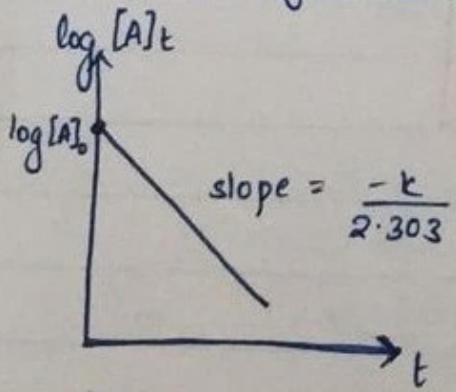


$$\text{rate} = k.$$



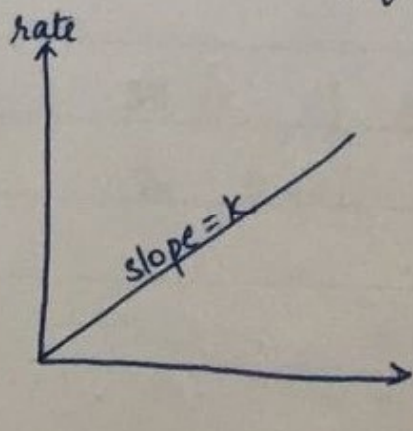
$$t_{1/2} = \frac{[A]_0}{2k}$$

→ For first order:



$$k = \frac{2.303}{t} \log \frac{[A]_0}{[A]_t} = \frac{2.303}{t} [\log A_0 - \log A_t]$$

$$\log[A]_t = \frac{-kt}{2.303} + \log[A]_0$$



$$\text{rate} = k[A]_t^1$$