(4) $\frac{2-1.1}{75}$ atm/min

$P = CRT$

$C = P/RT$

→ old

4 — 20
1 — 17

S-I

(7) $\frac{36\ g/min}{32} = \frac{\Delta[O_2]}{\Delta t}$

(9) $Rate = k[A]^2[B_2]$

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(11) $A + 2B \longrightarrow C + D$

$0.6 \quad 0.8$

$0.6-x \quad 0.8-2x \quad x \quad x$

$0.4 \quad 0.4 \quad 0.2 \quad 0.2$

$\text{Rate}_i = k(0.6)(0.8)^2$

$\text{Rate}_t = k(0.4)(0.4)^2$

$\longrightarrow$ 12 — 16 Zero order

(12) $[A]_t = [A]_0 - kt$

$= 10 - 1.2 \times 10^{-2} \times 20 \times 60$

$\doteq$

(14) $[H^+]_0 = \frac{6 \times 10^{-6}}{0.10/1000}$

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

1st order :-

(17) $$k = \frac{1}{t} \ln \frac{[A]_0}{[A]_t} = \frac{1}{72} \ln \frac{100}{25} = \frac{1}{t_1} \ln \frac{100}{50} = \frac{1}{t_2} \ln \frac{100}{12.5}$$

(19) $$\frac{t_{99.9\%}}{t_{50\%}}$$

(20) $$-\frac{d[A]}{dt} = k[A] = k[A]_0 e^{-kt}$$

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(1) $[A]_0 = 100$

$[A]_t$

fraction $[A]_0 = 1$

$$\frac{[A]_t}{[A]_0} = \text{fraction remaining}$$

$$kt = \ln \frac{[A]_0}{[A]_t}$$

$$\ln 4 = \ln \frac{[A]_0}{[A]_t}$$

$$\frac{[A]_t}{[A]_0} = \frac{1}{4}$$

for a 1st order rxn having $k = \ln 2 \ \text{min}^{-1}$. find

(1) fraction remaining
(2) " reacted
(3) % remaining
(4) % reacted

in 2 min.

Characteristics of 1st order Rxn :→

① Units of 'k' ⇒ time^{-1}, sec^{-1}, hr^{-1}

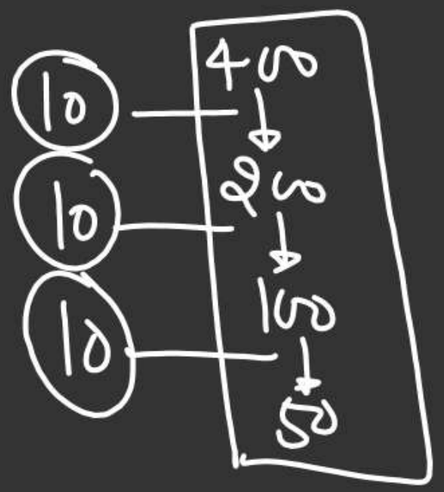
② Completion time $[A]_t = 0$

$$[A]_t = [A]_0 e^{-kt} \qquad t = \infty$$

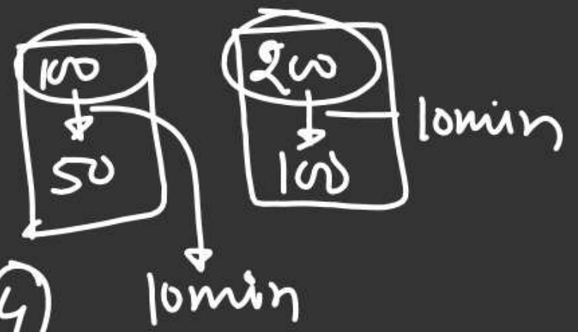
$$0.9\,[A]_0 = [A]_0 e^{-kt}$$

A ⟶ Product

$$-\frac{d[A]}{dt} = k[A]$$



③ $t_{1/2}$:→ $[A]_t = \frac{[A]_0}{2} = [A]_0 e^{-kt}$



$$\ln 2 = kt$$

$$t_{1/2} = \frac{\ln 2}{k} = \frac{0.693}{k}$$

④ $t_{3/4} = t_{1/2} + t'_{1/2}$

$$= 2\,t_{1/2}$$

(5) In equal interval of time equal % of reactant reacts.

time	0	t	$2t$	$3t$
Conc	100	$(0.9)100$	$(0.9)^2 100$	$(0.9)^3 100$
	$[A]_0$	$[A]_0 e^{-kt}$	$[A]_0 e^{-2kt}$	$[A]_0 e^{-3kt}$

(6) → Conc of reactant after equal interval of time constitute a G.P with common ratio e^{-kt}.

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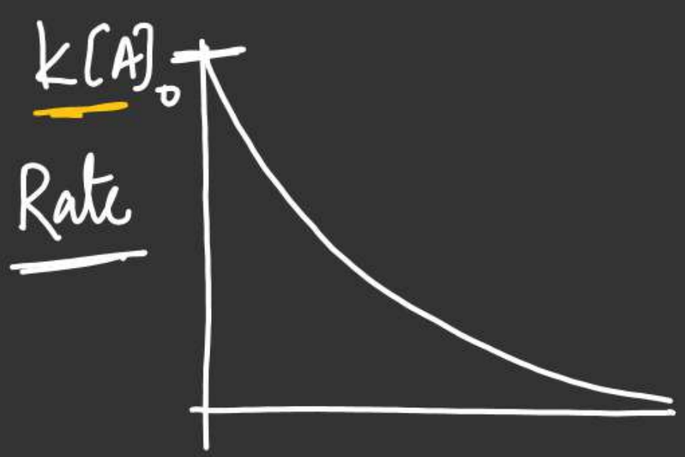
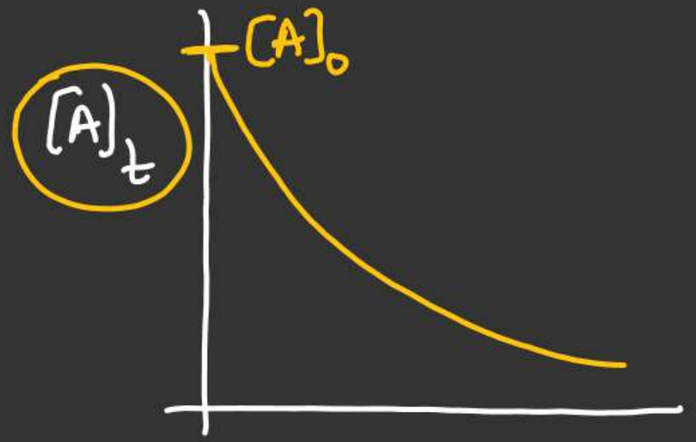


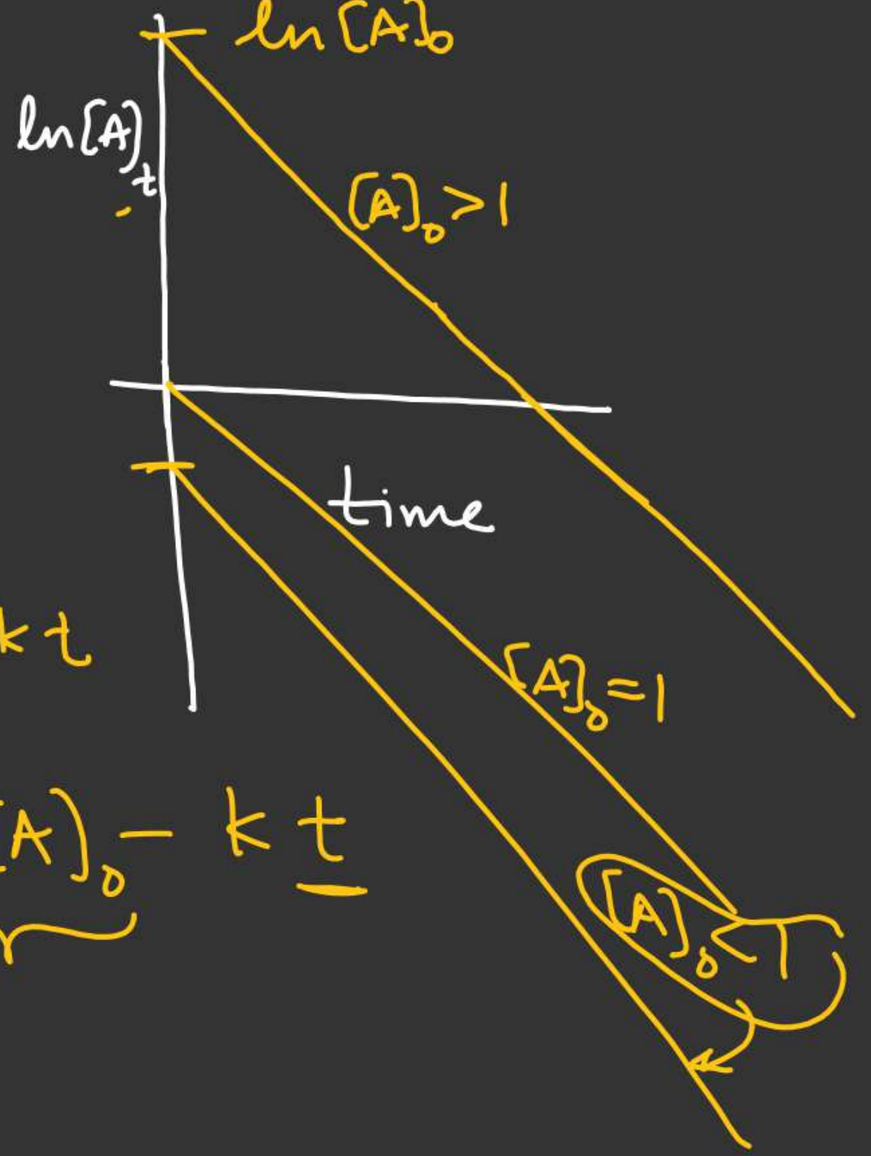
$$-\frac{d[A]}{dt} = k[A]$$

$$= k[A]_0 e^{-kt}$$



$$[A]_t = [A]_0 e^{-kt}$$

$$\ln[A]_t = \ln[A]_0 - kt$$



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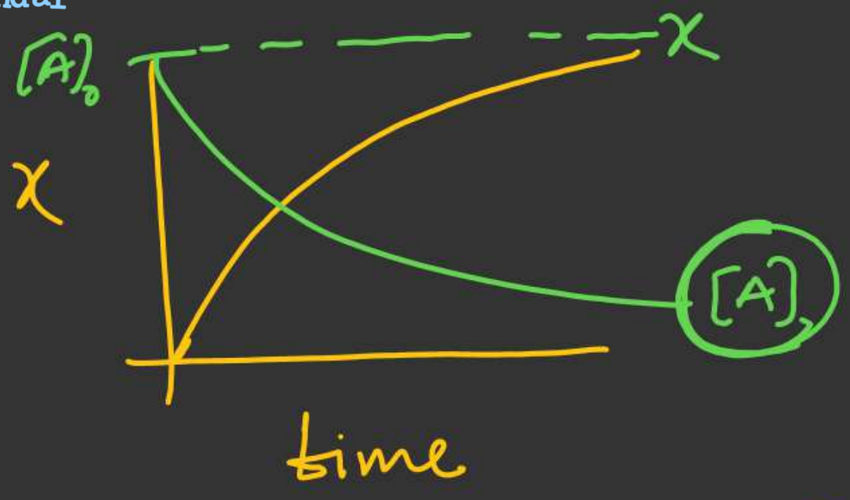
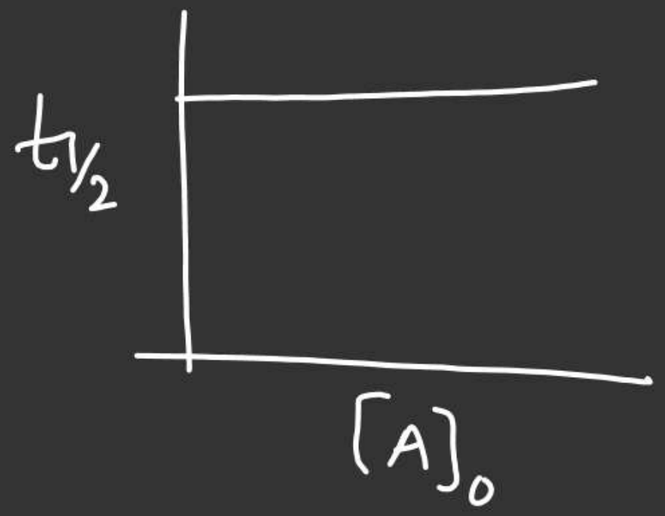


$$x = [A]_0 \left\{1 - e^{-kt}\right\}$$



2^{nd} order Rxn :→

Case-I Rxn involving only one reactant

$$nA \longrightarrow \text{Product}$$

$$-\frac{d[A]}{dt} = k[A]^2$$

$$\int -\frac{d[A]}{[A]^2} = k\int dt$$

$$\boxed{\frac{1}{[A]_t} - \frac{1}{[A]_0} = kt}$$

Characteristics

① Unit of $k = \left(\frac{mol}{lit}\right)^{-1} \times time^{-1}$

② Completion time $= \infty$

③ $t_{1/2} = \frac{1}{[A]_0 k}$

100	
↓	10 min
50	
↓	20 min
25	

④ $t_{3/4} = t_{1/2} + t'_{1/2}$

$t_{3/4} = 3\,t_{1/2}$

(5)

time	0	t	$2t$
$\frac{1}{\text{Conc}}$	$\frac{1}{[A]_0}$	$\frac{1}{[A]_0} + kt$	$\frac{1}{[A]_0} + 2kt$

Conc. of reactant after equal of time will constitute H.P.

$$\frac{1}{[A]_t} = \frac{1}{[A]_0} + kt$$

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O-I	15 – 30
S-I	18 – 22

T.D.: -2

JEE -Adv