what about:

$$2A \longrightarrow B$$

$$\text{rate} = -\frac{1}{2}\frac{\Delta[A]}{\Delta t} = \frac{\Delta[B]}{\Delta t}$$

in general:

$$aA + bB \longrightarrow cC + dD$$

$$\text{rate} = -\frac{1}{a}\frac{\Delta[A]}{\Delta t} = -\frac{1}{b}\frac{\Delta[B]}{\Delta t} \quad R$$

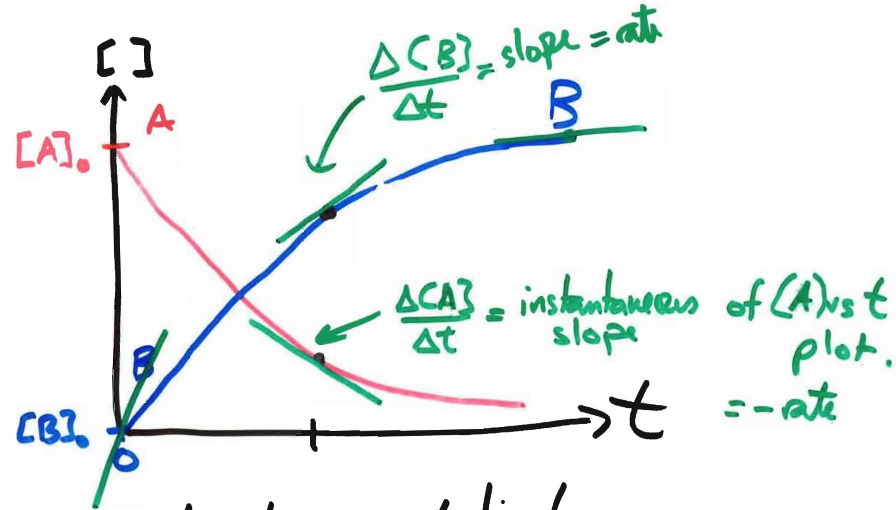
$$= +\frac{1}{c}\frac{\Delta[C]}{\Delta t} = +\frac{1}{d}\frac{\Delta[D]}{\Delta t} \quad P$$

ex: $3O_2(g) \longrightarrow 2O_3(g)$

$$\text{rate} = -\frac{1}{3}\frac{\Delta[O_2]}{\Delta t} = \frac{1}{2}\frac{\Delta[O_3]}{\Delta t}$$

* can measure any rxn rate! *

$A \rightarrow B$, $\text{rate} = -\frac{\Delta[A]}{\Delta t} = +\frac{\Delta[B]}{\Delta t}$



rate changes w/ time!

- in general, rate ↓ as t ↑

@ $t=0$

(time $=0$ aka start of expt)

- Rate = Initial Rate

concs of A, B = init. concs. $[A]_0$, $[B]_0$

We've learnt how to measure rate.

- we would like to predict/calculate a rate.

RATE LAW = A mathematical eq^n that can be used to PREDICT a rxn rate. as long as we know [Reactant]

ex: $A + 2B \rightarrow C$

$$rate = -\frac{\Delta[A]}{\Delta t} = -\frac{1}{2}\frac{\Delta[B]}{\Delta t} = +\frac{\Delta[C]}{\Delta t}$$

rate law: $rate = k[A]^3[B]^1$ ← example.

ex: $F_2(g) + 2ClO_2(g) \rightarrow 2FClO_2(g)$

@ start of XPT (init)

XPT #	$[F_2]_0$/M	$[ClO_2]_0$/M	init. rate/M s^{-1}
1	0.10	0.010	1.2×10^{-3}
2	0.10	0.040	4.8×10^{-3}
3	0.20	0.010	2.4×10^{-3}

look @ XPT 1+3

- ×2 init conc F_2
- ×2 init rate

} rate ∝ $[F_2]^1$

look @ XPT 1+2

→ ×4 init conc ClO_2
→ ×4 init rate

} rate ∝ $[ClO_2]^1$

rate ∝ $[F_2]$
∝ $[ClO_2]$

} → rate ∝ $[F_2][ClO_2]$

⇒ $rate = k[F_2][ClO_2]$ ← rate constant.