

X c1) The rate constant for a mystery reaction is $4.5 \times 10^{-3} \text{ M} \cdot \text{s}^{-1}$. By what order does this reaction proceed?

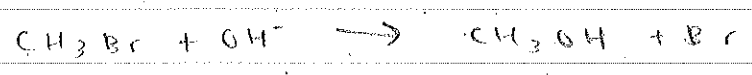
0 order

$$\text{rxn rate} = k [A]^x [B]^y$$

$$\text{rate} \left(\frac{\text{M}}{\text{s}} \right) = k \left(\frac{\text{M}}{\text{s}} \right) [A]^0 [B]^0$$

rate = k → 0 order rate law

* figure out order from units of k



$$\begin{matrix} \text{Macro} \\ -\Delta [\text{CH}_3\text{Br}] \\ \Delta t \end{matrix} = \begin{matrix} \text{Micro} \\ -d [\text{CH}_3\text{Br}] \\ dt \end{matrix} = \boxed{\text{rate}} = k [\text{CH}_3\text{Br}]^x [\text{OH}^-]^y$$

↑
rate law indicates how rate is dependent on concentration

4 things affect rate

- 1) Medium - by solid or crushed
- gas phase or solid
- 2) Concentration
- 3) Temperature
- 4) Catalyst

Rate is affected by concentration of reactants and medium.

SITUATIONS

Integrated rate laws (conc is function of time)

1) The rate law depends on only one reactant

2) 1 reactant is changing much in conc, only 1 conc is changing

1st order

- rate of rxn is directly proportional to conc of one of reactant

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

Integrated Rate Law

$$[A](t) = [A]_0 e^{-kt}$$

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

(2) (p. 11)

Activity Q1. What is conc of N_2O after 100 ms?

$$\boxed{-0.14 M}$$

(3) (p. 11)

Activity Q2. Value of k could be determined!

- determine slope of line from plot of

$\ln[N_2O_s]$ vs time. Value of k would

be negative of slope

(4) (p. 11)

Activity Q3. How long will it take A to dec to 1% of starting amount?

$$\boxed{5 \text{ sec}}$$

$$\ln(0.01) = -kt$$

(5) (part)

Activity 67. How many years will it take the isotope to drop to 30% of original amt?

$$\boxed{-41660 \text{ yrs}}$$

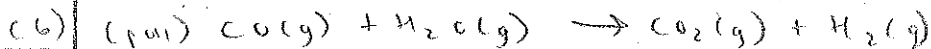
- first order b/c radioactive decay

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



$$\text{rate} = k[\text{H}_2\text{O}][\text{CO}]$$

first order in H_2O and
first order in CO



$$\text{rate} = k[\text{H}_2\text{O}][\text{CO}]$$

$$[\text{CO}]_0 = 0.01\text{M}$$

$$[\text{H}_2\text{O}]_0 = 0.01\text{M}$$

why is plot of $\ln[\text{CO}]$ not straight line?

- Both $[\text{CO}]$ and $[\text{H}_2\text{O}]$ are

changing