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Kinetics (4) Rate and Time Dependence - 2nd order

- ① * The rate constant for a 2nd order ~~ex~~ reaction $2\text{NO}_2 \rightarrow 2\text{NO} + \text{O}_2$ is $0.54/\text{m}$ at 300°C . How long in seconds will it take the conc. of NO_2 to decrease from 0.65M to 0.18M ?

Ans

$$\boxed{\frac{1}{[A]} = \frac{1}{[A]_0} + kt} \quad *$$

$$\frac{1}{0.18\text{M}} = \frac{1}{0.65\text{M}} + 0.54/\text{m} (t)$$

$$t = \boxed{7.4\text{S}}$$

- ② * In a 2nd order reaction $A \rightarrow \text{products}$, what is the conc. of $[A]$ after 55 sec. if the initial conc. is 0.80M . $k = 0.023/\text{ms}$

Ans

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

$$\frac{1}{[A]_t} = \frac{1}{0.80\text{M}} + (0.023/\text{ms})(55\text{s})$$

$$= 1.25 + 1.265$$

$$\frac{1}{[A]_t} = 2.515$$

$$[A]_t = \boxed{0.40\text{M}}$$