

Kinetics (6) - Time Dependence

In the 1st order decomposition of N_2O_5 at 335K, $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$,

if we start with ~~2.50g~~ 2.50g of N_2O_5 and have 1.50g remaining after 109s.

- (a) what is the rate constant k ?
- (b) what is the half life?
- (c) what mass of N_2O_5 will remain after 5.0min

Ans

$$\ln \frac{[A]}{[A]_0} = -kt \quad \leftarrow$$

$$(a) \ln \frac{1.50g}{2.50g} = -k \times 109s.$$

$$-0.511 = -k \times 109s.$$

$$k = \frac{+0.511}{109s} = \boxed{4.69 \times 10^{-3} / s.}$$

$$(b) t_{1/2} = \frac{0.693}{k} = \frac{0.693}{4.69 \times 10^{-3} / s} = \boxed{148s}$$

$$(c) \ln \frac{[A]}{2.5g} = -4.69 \times 10^{-3} / s \times (5 \times 60 s)$$

take inv. log (inv. of \ln $e^{-1.041}$)

$$\frac{[A]}{2.5} = 0.244$$

$$[A] = 0.244 \times 2.5g = \boxed{0.61g}$$