Separate --

Kinetics ⑥ – Time Dependence.

In the 1st order decomposition of N_2O_5 at 335k, $N_2O_5 \longrightarrow 2NO_2 + \frac{1}{2}O_2$, if we start with ~~2.50g~~ 2.50g of N_2O_5 and have 1.50g remaining after 109s

→ ⓐ What is the rate constant k?
→ ⓑ What is the half life?
→ ⓒ What mass of N_2O_5 will remain after 5.0min

Ans. $\ln \frac{[A]}{[A]_0} = -kt$ ←

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

$-0.511 = -k \times 109s$

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

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

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

$= -1.41$

take inv. log (inv. of ln $e^{-1.41}$)

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

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

Separate - -

Kinetics (6) – Time Dependence.

In the 1st order decomposition of N_2O_5 at 335k, $N_2O_5 \longrightarrow 2NO_2 + \frac{1}{2}O_2$, 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 5.0 min

Ans. $\ln \frac{[A]}{[A]_0} = -kt$ ←

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

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

$= -1.41$

take inv. log (inv. of ln $e^{-1.41}$)

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

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