1st order reactions

$$\ln\left(\frac{[A]_t}{[A]_0}\right) = -kt$$

$$\ln[A]_t = -kt + \ln[A]_0$$

How long will it take for $[N_2O_5]$ to go from 0.25 M to 0.125 M ?

$$\ln\left(\frac{[0.125]}{[0.25]}\right) = -(5.1\times10^{-4}\ s^{-1})\,t \qquad t = 23\ \text{min}$$

The half-life ($t_{1/2}$) is the time required for [reactant] to decrease to 1/2 $[\text{reactant}]_i$

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