

- 1) A certain reaction has the following general form: $aA \rightarrow bB$

At a particular temperature and $[A]_0 = 2.00 \times 10^{-2} M$, concentration versus time data were collected for this reaction, and a plot of $\ln [A]$ versus time resulted in a straight line with a slope value of $-2.97 \times 10^{-2} \text{ min}^{-1}$.

- Determine the rate law, the integrated rate law, and the value of the rate constant for this reaction.
- Calculate the half-life for this reaction.
- How much time is required for the concentration of A to decrease to 2.50×10^{-3} ?

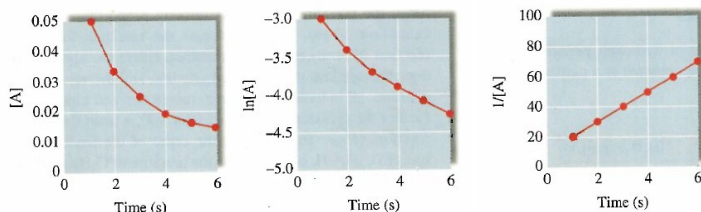
- 2) A certain reaction has the following general form: $aA \rightarrow bB$

At a particular temperature and $[A]_0 = 2.80 \times 10^{-3} M$, concentration versus time data were collected for this reaction, and a plot of $1/[A]$ versus time resulted in a straight line with a slope value of $+3.60 \times 10^{-2} \text{ L/mol} \cdot \text{sec}$.

- Determine the rate law, the integrated rate law, and the value of the rate constant for this reaction.
- Calculate the half-life for this reaction.
- How much time is required for the concentration of A to decrease to $7.00 \times 10^{-4} M$?

- 3) Experimental data for the reaction: $A \rightarrow 2B + C$

have been plotted in the following three ways (with concentration units in mol/L):



- What is the concentration of A after 9 seconds?
- What are the first three half-lives for this experiment?

- 4) The radioactive isotope ^{32}P decays by first-order kinetics and has a half-life of 14.3 days. How long does it take for 95.0% of a sample of ^{32}P to decay?

- 5) The rate law for the decomposition of phosphine (PH_3) is

$$\text{Rate} = - \frac{\Delta[\text{PH}_3]}{\Delta t} = k [\text{PH}_3]$$

It takes 120.0 seconds for 1.00 M PH_3 to decrease to 0.250 M. How much time is required for 2.00 M PH_3 to decrease to a concentration of 0.350 M?

- 6) The rate law for the reaction: $2 \text{NOBr}_{(g)} \rightarrow 2 \text{NO}_{(g)} + \text{Br}_{2(g)}$ at some temperature is

$$\text{Rate} = - \frac{\Delta[\text{NOBr}]}{\Delta t} = k [\text{NOBr}]^2$$

- If the half-life for this reaction is 2.00 s when $[\text{NOBr}]_0 = 0.900 \text{ M}$, calculate the value of k for this reaction.
- How much time is required for the concentration of NOBr to decrease to 0.100 M?