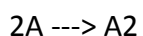


Answer on Question #64064 - Chemistry - General Chemistry

Given:



$$\text{rate} = k[A]^2$$

If the rate constant is 0.014 1/M.s and the initial concentration of A is 0.0180 M, find the time required for the rate of consumption of A to drop to 1.25×10^{-5} M/s.

Solution:

Integrated rate law equation for a 2nd order reaction:

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

Hence,

$$t = \frac{\frac{1}{[A]_0} - \frac{1}{[A]_t}}{k}$$

From final rate of consumption:

$$[A]_t = \sqrt{\frac{\text{rate}}{k}}$$

So,

$$t = \frac{\frac{1}{0.0180} - \frac{1}{\sqrt{\frac{1.25 \cdot 10^{-5}}{0.014}}}}{0.014}$$

Answer:

$$t = 1577.797 \text{ s}$$