

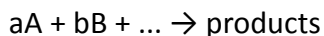
Answer on Question #43304, Chemistry, Other

Question:

The rate constant for a second order reaction (second order in A) is $k = 0.132 \text{ L/mol}\cdot\text{s}$. What is the rate of the reaction when the concentration of A is 0.158 mol/L ?

Solution:

Generally, for a reaction of the form



the rate law will be

$$r = k[A]^a[B]^b\dots$$

In this expression, the k is the reaction rate coefficient or rate constant, the exponents a and b are the reaction orders and depend on the reaction mechanism, $[A]$ and $[B]$ is molar concentrations of species A and B.

If rate of reaction depends on only one reactant concentration, rate law equation simplifies to $r = k[A]^a$.

We can use this equation:

$$r = 0.132 \text{ L/mol}\cdot\text{s} \times (0.158 \text{ mol/L})^2 = 0.00330 \text{ mol/L}\cdot\text{s} = 3.30 \times 10^{-3} \text{ mol/L}\cdot\text{s}$$

Answer:

The rate of the reaction is $3.3 \times 10^{-3} \text{ mol/L}\cdot\text{s}$