Answer on Question #73455 – Chemistry – General Chemistry

The half life of a given compound is 200 seconds in a first order reaction. If the initial concentration is 81.6 M, what is the concentration in units of M after exactly 1 hour?

Solution:

This is a 1st order reaction of the form:

A → products

As the reaction is 1st order the following expression applies:

ln $[A]_t$ = ln $[A]_0$ − kt

$[A]_0$ is the initial concentration of A

$[A]_t$ is the concentration of A after time t

Half life = 200 s (50 % reacted)

ln 50 = ln 100 − kt

kt = ln 100 − ln 50

k = (4.605 − 3.912) / 200 = 0.003465 s^{-1}

$[A]_t$ = $[A]_0$ × e^{-kt} = 81.6 × e$^{-0.003465 \times 3600}$ = 0.0003121 M