

First-Order Reaction

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A first-order reaction is a reaction that depends on the concentration of a single first order reactant.

The differential first-order rate law is

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

where k is the rate constant and $[A]$ is the concentration of reactant A.

The integrated first-order rate law is

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

where $[A]_t$ is the concentration of reactant A at time t and $[A]_0$ is the initial concentration of reactant A.

The half-life of a first-order reaction is

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