

# CH14 - EQUATIONS

## KEY EQUATIONS

- $\text{Rate} = -\frac{1}{a} \frac{\Delta[A]}{\Delta t} = -\frac{1}{b} \frac{\Delta[B]}{\Delta t} = \frac{1}{c} \frac{\Delta[C]}{\Delta t} = \frac{1}{d} \frac{\Delta[D]}{\Delta t}$  [14.4] Relating rates to the components of the balanced chemical equation  $aA + bB \rightarrow cC + dD$
- $\text{Rate} = k[A]^m[B]^n$  [14.7] General form of a rate law for the reaction  $A + B \rightarrow \text{products}$
- $\ln[A]_t - \ln[A]_0 = -kt$  or  $\ln \frac{[A]_t}{[A]_0} = -kt$  [14.12] The integrated form of a first-order rate law for the reaction  $A \rightarrow \text{products}$
- $\frac{1}{[A]_t} = kt + \frac{1}{[A]_0}$  [14.14] The integrated form of the second-order rate law for the reaction  $A \rightarrow \text{products}$
- $t_{1/2} = \frac{0.693}{k}$  [14.15] Relating the half-life and rate constant for a first-order reaction
- $k = Ae^{-E_a/RT}$  [14.19] The Arrhenius equation, which expresses how the rate constant depends on temperature
- $\ln k = -\frac{E_a}{RT} + \ln A$  [14.20] Linear form of the Arrhenius equation

ORDER

0  $[A]_t = -kt + [A]_0$  56  
57

1  $\ln [A]_t = -kt + \ln [A]_0$  65

2  $\frac{1}{[A]_t} = -kt + \frac{1}{[A]_0}$  66