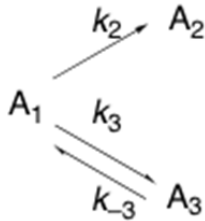


- Integrate the differential first-order rate law $dc_A/dt = -k c_A$ ($k = 1 \text{ s}^{-1}$) using Euler's approximation (4 steps, $c_A(0) = 1 \text{ M}$, $\Delta t = 0.1 \text{ s}$) starting at $t = 0$ and compare with the exact result.
- a) Given the following reaction mechanism, write the system of coupled differential equations for the reactions of compounds A_1 to A_3 .



- The rate constants are $k_2 = 1 \text{ s}^{-1}$, $k_3 = 1000 \text{ s}^{-1}$, and $k_{-3} = 100 \text{ s}^{-1}$. Which approximations are applicable to simplify the integration of these equations?
- Sketch the expected concentration profiles qualitatively for case b) in the diagram below, given that the initial conditions are $c_1(t=0) = 1 \text{ M}$, $c_2(0) = c_3(0) = 0 \text{ M}$ (indicate the time scale).



3. Interpret the three legs of the pH-Rate profile for the enolization of 2,4-cyclohexadienone to phenol. a) left: slope -1, b) middle: slope 0, c) right: slope +1]. Give the observed rate law, $c(t) = \dots$, holding in the linear region of each leg and propose a reasonable mechanism for each. Hints a) The protonation of carbonyl oxygen is not rate-determining. b) The reaction is not an intramolecular 1,3-H shift (the reaction is much slower in aprotic solvents). Hint: The enolization reaction is (practically) irreversible.

