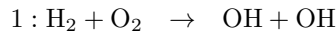
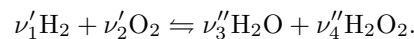


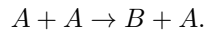
1. Consider the irreversible reaction mechanism



- (a) Identify the number of species N , reactions J , and elements L .
(b) Find the $L \times N$ species-element matrix ϕ .
(c) Find the $N \times J$ stoichiometric reaction matrix ν .
(d) Demonstrate $\phi \cdot \nu = \mathbf{0}$.
(e) For isothermal, isochoric kinetics, write an ordinary differential equation for the evolution of the concentration of H; define any necessary constants.
2. Find the most general stoichiometric balance for the reaction



3. Species A and B have identical molecular masses and identical specific heats and undergo an irreversible reaction described by



The reaction is *adiabatic* and *isochoric*. The fixed volume is V , and no mass enters or exits the volume. At $t = 0$, $T = T_o$, $\bar{p}_A = \bar{p}_{Ao}$, and $\bar{p}_B = 0$. The reaction has $\mathcal{E} = 0$ and $\beta = 0$. It has collision frequency factor a , constant \bar{c}_v , and is exothermic.

- (a) Write an appropriate simple ordinary differential equations for the change of \bar{p}_A with respect to time.
(b) Find the equilibrium concentration of A .
(c) Find $\bar{p}_A(t)$ and $T(t)$.