

Competition Corner: Perturbation Evidence

g10_u04_w15

Use a stated reaction and condition set. Replace a slogan with an evidence-based, bounded claim whenever possible.

1. For $J + K \rightleftharpoons L$, $K_c = 4.00 \text{ M}^{-1}$. An equilibrium state is (0.200, 0.250, 0.200) M. A student instantly adds 0.100 M of L . Calculate the new immediate Q_c , predict net direction, and explain why the final $[L]$ cannot be found without more information.
2. For $3M(g) \rightleftharpoons 2N(g)$, a compression card reports decreased volume at constant temperature. Use the particle-count model to predict a direction, then state why this does not quantify the new equilibrium composition.
3. An endothermic-forward reaction has $K_c = 0.50$ at 300 K and $K_c = 2.0$ at 330 K. An old equilibrium mixture is heated. Explain the quotient comparison and distinguish this from a catalyst effect.
4. A catalyst makes both directions faster in a reversible simulation. Give two observations consistent with that claim and two equilibrium claims that would remain unsupported without additional data.
5. Critique: “Le Châtelier’s principle says every stress is undone.” Write a replacement statement that distinguishes a net response from perfect cancellation.