

Grade 10 Unit 4 Quiz: Equilibrium

Dynamic systems, Q/K , perturbations, and model bounds

Name: _____

Date: _____

Time: 30 minutes. Calculator permitted. Equilibrium cards are fictional paper models; state what a model supports and what it does not.

1. At dynamic equilibrium, which statement is correct? [1 pts]

- A. Both reactions stop.
- B. Forward and reverse rates are equal.
- C. Reactant and product concentrations must be equal.
- D. Temperature is zero.

2. For $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$, write K_c . [2 pts]

3. A system has $Q = 0.40$ and $K = 2.0$. Predict the net direction toward equilibrium and justify. [2 pts]

4. Data: at equilibrium, $[A] = 0.20 \text{ M}$, $[B] = 0.50 \text{ M}$, and $K_c = [B]/[A]$. Calculate K_c . [2 pts]

5. For an exothermic reaction, temperature is increased. Use an energy-model argument to predict the equilibrium shift. [2 pts]

6. A catalyst is added to an equilibrium mixture. State its effect on forward/reverse rates and its effect on K at unchanged temperature. [2 pts]

-
7. A sealed gas system is compressed. A student claims it always shifts toward fewer gas moles. Identify the condition needed before that claim is justified. [2 pts]
-

-
8. A simulation shows concentrations leveling off. Identify one conclusion it supports and one claim about product safety or industrial performance it cannot support. [3 pts]
-