

Review of Equilibrium

Factor	Effect on K	Rate of Reaction	Effect on Equilibrium Position
1. Concentration			
A) Increasing the concentration of a species X	No change	Faster: * the probability of collisions increases	New equilibrium position contains a lower concentration of X
B) Increasing the concentration of the reactant	No change	Faster * the probability of collisions increases	Favors the forward reaction
C) Decreasing the concentration of the product	No change	Faster * the probability of collisions increases	Favors the forward reaction
D) Increasing the concentration of the product	No change	Faster * the probability of collisions increases	Favors the reverse reaction
E) Decreasing the concentration of the reactant	No change	Faster * the probability of collisions increases	Favors the reverse reaction
2. Temperature			
A) Increasing the temperature	Change	Faster, equilibrium is attained more quickly	New equilibrium position with a higher proportion of the substance made by the <i>endothermic</i> reaction
B) Decreasing the temperature	Change	Slower	New equilibrium with a higher concentration/greater yield of the substance made by the <i>exothermic</i> reaction

<p>3. Pressure</p> <p>A) Increasing the pressure * <i>Note:</i> Only gases are affected by an increase in pressure (for an unequal number of molecules)</p> <p>B) Decreasing the pressure</p> <p>C) For reactions with equal numbers of molecules on both sides of the equation</p>	<p>No change</p> <p>No change</p> <p>No change</p>	<p>Faster: Concentration effect * molecules are brought nearer due to a decrease in volume. * there is a greater number of collisions</p> <p>Slower * a decrease in pressure means an increase in volume * molecules are farther apart hence there are less collisions</p> <p>* A faster reaction with an increased pressure * A slower reaction with a decreased pressure</p>	<p>New Equilibrium with a greater yield of the substance made by the reaction in which there is a reduction of molecules.</p> <p>New equilibrium with a greater yield of substances in the reaction and an increase in the number of molecules</p> <p>No change</p>
<p>4. Catalyst</p>	<p>No change</p>	<p>Faster</p>	<p>No change</p>
<p>5. Volume</p> <p>A. Increasing volume * Decreasing concentration and pressure</p> <p>B. Decreasing volume * Increasing concentration and pressure</p> <p>C. Effect of adding an inert (Noble gas)</p>	<p>No change</p> <p>No change</p> <p>No change</p>	<p>Slower * frequency of collisions decreases</p> <p>Faster * frequency of collisions increases</p> <p>No change</p>	<p>Favors reactions with more gas molecules</p> <p>Favors the side with fewer gas molecules</p> <p>No effect on equilibrium * total pressure increases * concentration or partial pressure of the gases reacting remains constant</p>