

Le Chatelier's Principle 🙉



1. Predict the effect of decreasing the temperature on the position of the following equilibria.

(a)
$$H_2(g) + Cl_2(g) \rightleftharpoons 2 HCl(g) + 49.7 kJ$$

(b)
$$2 \text{ NH}_3 (g) \rightleftharpoons \text{N}_2 (g) + 3 \text{ H}_2 (g)$$
; $\Delta H = 37.2 \text{ kJ}$

(c) CO (g) +
$$H_2O$$
 (g) \rightleftharpoons CO₂ (g) + H_2 (g); $\Delta H = -27.6$ kJ

2. For the reaction:

CO (g) + 2 H₂ (g)
$$\rightleftharpoons$$
 CH₃OH (g) $\Delta H = -91 \text{ kJ}$

$$\Delta H = -91 \text{ kI}$$

Predict the effect on the position of equilibrium that results from:

Stress	Shift	Stress	Shift
The pressure is increased		H₂ is removed	
The temperature is increased		A catalyst is added	
CO is added		An inert gas is added	

3. Given the reaction at equilibrium : $2 A (g) + 3 B (g) \rightleftharpoons A_2 B_3 (g) + \text{heat}$

Which change will not affect the equilibrium concentrations of A (g), B (g), and A₂B₃ (g)?

(A) adding more A(g)

- (B) adding a catalyst
- (C) increasing the temperature
- (D) increasing the pressure

Ans: _____

4. Consider the following equilibrium system in a closed vessel. N₂O₄ is a colorless gas, while NO₂ is a red/brown gas.

$$N_2O_4(g) \rightleftharpoons 2 NO_2(g)$$

$$\Delta H = +57.2 \text{ kJ/mol}$$

Predict what will happen to the color of the gas mixture in the vessel (lighten, darken) if:

- (a) More N₂O₄ is added to the vessel
- (b) The volume of the vessel is increased
- (c) The system is cooled down



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1. Predict the effect of decreasing the temperature on the position of the following equilibria.

(a) $H_2(g) + Cl_2(g) \rightleftharpoons 2 HCl(g) + 49.7 kJ$

Equilibrium will shift to favor products.

(b) $2 \text{ NH}_3 (g) \rightleftharpoons \text{N}_2 (g) + 3 \text{ H}_2 (g)$; $\Delta H = 37.2 \text{ kJ}$

Equilibrium will shift to favor reactants.

(c) CO (g) + H_2O (g) \rightleftharpoons CO₂ (g) + H_2 (g); $\Delta H = -27.6$ kJ Equilibrium will shift to favor products.

2. For the reaction:

$$CO(g) + 2 H_2(g) \rightleftharpoons CH_3OH(g)$$

$$\Delta H = -91 \text{ kJ}$$

Predict the effect on the position of equilibrium that results from:

Stress	Shift	Stress	Shift
The pressure is increased	Right	H₂ is removed	Left
The temperature is increased	Left	A catalyst is added	None
CO is added	Right	An inert gas is added	None

3. Given the reaction at equilibrium : $2 A (g) + 3 B (g) \rightleftharpoons A_2 B_3 (g) + \text{heat}$

Which change will not affect the equilibrium concentrations of A (g), B (g), and A₂B₃ (g)?

(A) adding more A(g)

- (B) adding a catalyst
- (C) increasing the temperature
- (D) increasing the pressure

Ans: B

4. Consider the following equilibrium system in a closed vessel. N₂O₄ is a colorless gas, while NO₂ is a red/brown gas.

$$N_2O_4(g) \rightleftharpoons 2 NO_2(g)$$

$$\Delta H = +57.2 \text{ kJ/mol}$$

Predict what will happen to the color of the gas mixture in the vessel (lighten, darken) if:

(a) More N_2O_4 is added to the vessel

The concentration of N₂O₄ will increase, causing the equilibrium to shift towards the products to maintain equilibrium.

(b) The volume of the vessel is increased

The equilibrium will shift towards the side with more moles of gas to maintain equilibrium.

(c) The system is cooled down

The equilibrium will shift towards the side that produces heat.