

Chemical Equilibrium

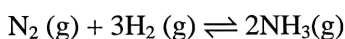
DPP-03

- A reversible reaction having two reactants in equilibrium if the concentration of reactants are doubled, the equilibrium constant will
 - Become 4 times
 - Become $\frac{1}{4}$ th times
 - Become $\frac{1}{16}$ th times
 - Remains the same
- Reaction $A(g) + B(g) \rightleftharpoons C(g) + D(g)$.
If the concentration of A is doubled then
 - Equilibrium constant (K_c) will be doubled
 - Equilibrium constant (K_c) will be halved
 - Equilibrium constant (K_c) remains unaffected
 - Equilibrium constant (K_c) will become four times
- The concentration of a pure solid or liquid phase is not included in the expression of equilibrium constant because
 - solid and liquid concentrations are independent of their quantities.
 - solid and liquids react slowly.
 - solid and liquids at equilibrium do not interact with gaseous phase.
 - the molecules of solids and liquids cannot migrate to the gaseous phase.
- If K_1 and K_2 are the equilibrium constants for a reversible reaction at T_1 K and T_2 K temperature, respectively ($T_1 < T_2$) and the reaction takes place with neither heat evolution nor absorption, then
 - $K_1 > K_2$ at high temperature
 - $K_1 < K_2$ at high temperature
 - $K_1 = K_2$ only at high temperature
 - $K_1 = K_2$ at any temperature
- For the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$, the relation between the degree of dissociation of $N_2O_4(g)$ at pressure, P with its equilibrium constant K_P is
 - $\alpha = \frac{K_P / P}{4 + K_P / P}$
 - $\alpha = \frac{K_P}{4 + K_P}$
 - $\alpha = \left[\frac{K_P / P}{4 + K_P / P} \right]^{1/2}$
 - $\alpha = \left[\frac{K_P}{4 + K_P} \right]^{1/2}$
- At T K, a compound $AB_2(g)$ dissociates according to the reaction $2AB_2(g) \rightleftharpoons 2AB(g) + B_2(g)$, with degree of dissociation 'x' which is small compared with unity. The expression for 'x' in terms of the equilibrium constant, K_P and the total pressure P is
 - $\frac{K_P}{P}$
 - $(K_P)^{1/3}$
 - $\left(\frac{2K_P}{P} \right)^{1/3}$
 - $\left(\frac{K_P}{P} \right)^{1/3}$
- The equilibrium $SOCl_2 \rightleftharpoons SO_2(g) + Cl_2(g)$ is attained at 25°C in a closed rigid container and helium gas is introduced. Which of the following statements is correct?
 - Concentration of SO_2 is increased.
 - More Cl_2 is formed.
 - Concentrations of all change.
 - Concentrations will not change.
- Which of the following will shift the reaction $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$, $\Delta H = (+)$ ve to the left hand side?
 - Addition of PCl_5
 - Increase in pressure
 - Increase in temperature
 - Catalyst

9. For the given equilibrium reaction $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$. The addition of more $\text{CaCO}_3(\text{s})$ causes

- (1) The decrease in the concentration of $\text{CO}_2(\text{g})$
- (2) The increase in the concentration of $\text{CO}_2(\text{g})$
- (3) No change in the concentration of $\text{CO}_2(\text{g})$
- (4) Increase in the concentration of $\text{CaO}(\text{s})$

10. Given the following reaction at equilibrium



Some inert gas is added at constant volume. Predict which of the following facts will be affected?

- (1) More of $\text{NH}_3(\text{g})$ is produced
- (2) Less of $\text{NH}_3(\text{g})$ is produced
- (3) No affect on the degree of advancement of reaction at equilibrium
- (4) K_p of reaction is increased

11. $\log \frac{K_p}{K_c} + \log RT = 0$ is a relationship for the reaction:

- (1) $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$
- (2) $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$
- (3) $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$
- (4) $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$

12. For the dissociation reaction

$\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$, the degree of dissociation (α) in terms of K_p and total equilibrium pressure P

is :

- (1) $\alpha = \sqrt{\frac{4P + K_p}{K_p}}$
- (2) $\alpha = \sqrt{\frac{K_p}{4P + K_p}}$
- (3) $\alpha = \sqrt{\frac{K_p}{4P}}$
- (4) None of these

13. In a vessel containing N_2 , H_2 and NH_3 at equilibrium, some helium gas is introduced so that total pressure increase while temperature and volume remain constant. According to Le Chatelier's principle, the dissociation of NH_3 :

- (1) increases
- (2) decreases
- (3) remains unaltered
- (4) changes unpredictably

1. (4)
2. (3)
3. (1)
4. (4)
5. (3)
6. (3)
7. (4)

8. (1)
9. (3)
10. (3)
11. (2)
12. (2)
13. (3)