

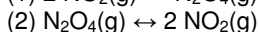
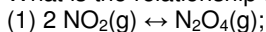
Question 1

The equilibrium constant K_{eq} for a certain reaction will change if _____ changes.

- ☐ A) pressure
- ☐ B) time
- ☐ C) volume
- ☐ D) temperature
- ☐ E) reactant concentrations

Question 2

What is the relationship of the equilibrium constants for the following two reactions?



- ☐ A) K_{eq} of reaction (1) is the reciprocal of K_{eq} of reaction (2).
- ☐ B) K_{eq} of reaction (2) is the reciprocal of K_{eq} of reaction (1)
- ☐ C) K_{eq} of reaction (1) = K_{eq} of reaction (2)
- ☐ D) Answers A and B are both correct
- ☐ E) There is no relationship between the K_{eq} s of these reactions

Question 3

What is the correct equilibrium constant expression for the following reaction? $2 \text{Cu}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2 \text{CuO}(\text{s})$

- ☐ A) $K_{eq} = 1/[\text{O}_2]^2$
- ☐ B) $K_{eq} = [\text{CuO}]^2/[\text{Cu}]^2$
- ☐ C) $K_{eq} = [\text{CuO}]^2/[\text{Cu}]^2[\text{O}_2]$
- ☐ D) $K_{eq} = [\text{O}_2]$
- ☐ E) $K_{eq} = 1/[\text{O}_2]$

Question 4

Consider the reaction: $2 \text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \leftrightarrow 2 \text{SO}_3(\text{g})$. If, at equilibrium at a certain temperature, $[\text{SO}_2] = 1.50 \text{ M}$, $[\text{O}_2] = 0.120 \text{ M}$, and $[\text{SO}_3] = 1.25 \text{ M}$, what is the value of the equilibrium constant?

- ☐ A) 5.79
- ☐ B) 6.94
- ☐ C) 8.68
- ☐ D) 0.14
- ☐ E) None of the above

Question 5

PCl_5 dissociates according to the reaction: $\text{PCl}_5(\text{g}) \leftrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$. One mole of PCl_5 was placed in one liter of solution. When equilibrium was established, 0.5 mole of PCl_5 remained in the mixture. What is the equilibrium constant for this reaction?

- ☐ A) 0.25
- ☐ B) 0.5
- ☐ C) 1.0
- ☐ D) 2.5
- ☐ E) None of the above

Question 6

At elevated temperatures, solid silicon reacts with chlorine gas to form gaseous SiCl_4 . At some temperature, the equilibrium constant for this reaction is 0.30. If the reaction is started with 0.10 mol of SiCl_4 in a one-liter flask, how much Cl_2 will be present when equilibrium is established?

- ☐ A) 0.18 mol
- ☐ B) 0.090 mol
- ☐ C) 0.030 mol
- ☐ D) 0.30 mol

Question 7

Consider the reaction: $\text{CO}_2(\text{g}) + \text{H}_2(\text{g}) \leftrightarrow \text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g})$, for which $K_c = 0.64$ at 900 K. If the initial CO_2 and of H_2 are each 0.100 M, what will be the equilibrium concentrations of each species after the reaction reaches equilibrium?

- ☐ A) $[\text{CO}_2] = 0.044 \text{ M}$; $[\text{H}_2] = 0.044 \text{ M}$; $[\text{CO}] = 0.056 \text{ M}$; $[\text{H}_2\text{O}] = 0.056 \text{ M}$
- ☐ B) $[\text{CO}_2] = 0.056 \text{ M}$; $[\text{H}_2] = 0.056 \text{ M}$; $[\text{CO}] = 0.044 \text{ M}$; $[\text{H}_2\text{O}] = 0.044 \text{ M}$
- ☐ C) $[\text{CO}_2] = 0.020 \text{ M}$; $[\text{H}_2] = 0.020 \text{ M}$; $[\text{CO}] = 0.080 \text{ M}$; $[\text{H}_2\text{O}] = 0.080 \text{ M}$
- ☐ D) $[\text{CO}_2] = 0.080 \text{ M}$; $[\text{H}_2] = 0.080 \text{ M}$; $[\text{CO}] = 0.020 \text{ M}$; $[\text{H}_2\text{O}] = 0.020 \text{ M}$
- ☐ E) None of the above

Question 8

At some temperature, the reaction: $3 \text{ClO}^- \leftrightarrow \text{ClO}_3^- + 2 \text{Cl}^-$ has an equilibrium constant $K_c = 3.2 \times 10^3$. If the components of this reaction are mixed such that their initial concentrations are $[\text{Cl}^-] = 0.05 \text{ M}$; $[\text{ClO}_3^-] = 0.32$; and $[\text{ClO}^-] = 0.74$, is the mixture at equilibrium, yes or no? If the mixture is not at equilibrium in which direction, left to right or right to left, will reaction occur so that the mixture can reach equilibrium?

- ☐ A) There is not enough information given to answer this question
- ☐ B) Yes, the mixture is at equilibrium now
- ☐ C) No. Left to right
- ☐ D) No. Right to left

Question 9

Consider the following endothermic reaction: $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \leftrightarrow 2 \text{HI}(\text{g})$. If the temperature is increased,

- ☐ A) more HI will be produced
- ☐ B) some HI will decompose, forming H_2 and I_2

- ☐ C) the magnitude of the equilibrium constant will decrease
- ☐ D) the pressure in the container will increase
- ☐ E) the pressure in the container will decrease

Question 10

Consider the following reaction at equilibrium: $\text{NO}_2(\text{g}) + \text{CO}(\text{g}) \leftrightarrow \text{NO}(\text{g}) + \text{CO}_2(\text{g})$. Suppose the volume of the system is decreased at constant temperature, what change will this cause in the system?

- ☐ A) A shift to produce more NO
- ☐ B) A shift to produce more CO
- ☐ C) A shift to produce more NO_2
- ☐ D) No shift will occur

Question 11

Which of the following statements is incorrect regarding equilibrium?

- ☐ A) Chemical equilibrium is a reversible process with no net change in concentrations of the products and reactants.
- ☐ B) Physical equilibrium can not exist between phases.
- ☐ C) A chemical equilibrium with all reactants and products in the same phase is homogeneous.
- ☐ D) none of the above

Question 12

Which of these four factors can change the value of the equilibrium?

- ☐ A) catalyst
- ☐ B) pressure
- ☐ C) concentration
- ☐ D) temperature

Question 13

Which general rule helps predict the shift in direction of an equilibrium reaction?

- ☐ A) Le Chatelier's principle
- ☐ B) Haber process
- ☐ C) Equilibrium constant
- ☐ D) Bosch theory

Question 14

There are guideline to help write equilibrium constants.

- ☐ A) True
- ☐ B) False

