PHYSICAL CHEMISTRY

NEET

CRASH COURSE

CHEMICAL EQUILIBRIUM

SMART ACHIEVERS

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CHEMICAL EQUILIBRIUM

Q.1 $\log \frac{K_p}{K_c} + \log RT = 0$ is a relationship for the reaction :

(1) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ (2) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

(3) $H_2 + I_2 \rightleftharpoons 2HI$ (4) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

Q.2 For the reaction

$CuSO_4.5H_2O(s) \rightleftharpoons CuSO_4.3H_2O(s) + 2H_2O(g)$

Which one is correct representation :

(1) $K_P = (P_{H_2O})^2$ (2) $K_C = [H_2O]^2$ (3) $K_P = K_C(RT)^2$ (4) All

Q.3 In the reaction $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$, the equilibrium pressure is 12 atm. If 50% of CO_2 reacts then K_p will be :

(1) 12 atm (2) 16 atm (3) 20 atm (4) 24 atm

Q.4 At 248° C , the k_p for the reaction , $SbCl_5(g) \rightleftharpoons SbCl_3(g) + Cl_2(g)$ is 1.07 atm at a total pressure of 1 atm . Calculate the degree of dissociation of $SbCl_5$.

(1) 0.516 (2) 0.718 (3) 0.321 (4) None of these

Q.5 4 moles of A are mixed with 4 moles of B, when 2 moles of C are formed at equilibrium, according to the reaction, $A + B \rightleftharpoons C + D$. The equilibrium constant is :

(1) 4 (2) 1 (3) $\sqrt{2}$ (4) $\sqrt{4}$

Q.6 The correct relationship between free energy change in a reaction and the corresponding equilibrium constant K is :

(1) $-\Delta G^o = RT \ln K$ (2) $\Delta G = RT \ln K$ (3) $-\Delta G = RT \ln K$ (4) $\Delta G^o = RT \ln K$

Q.7 The effect of temperature on equilibrium constant is expressed as $(T_2 > T_1)$

$\log K_2 / \log K_1 = \frac{-\Delta H}{2.303R}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$. For endothermic reaction false statement is

(1) $\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$ = positive (2) ΔH = positive

(3) $\log K_2 > \log K_1$ (4) $K_2 > K_1$

Q.8 On cooling of following system at equilibrium $CO_2(s) \rightleftharpoons CO_2(g)$

(1) There is no effect on the equilibrium state (2) More gas is formed

(3) More gas solidifies (4) None of above

Q.9 For an equilibrium $H_2O(s) \rightleftharpoons H_2O(\ell)$ which of the following statements is true.

(1) The pressure changes do not affect the equilibrium

(2) More of ice melts if pressure on the system is increased

(3) More of liquid freezes if pressure on the system is increased

(4) The degree of advancement of the reaction do not depend on pressure.

Q.10 For the following three reactions a, b and c, equilibrium constants are given:
(a) $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$; K_1
(b) $CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$; K_2
(c) $CH_4(g) + 2H_2O(g) \rightleftharpoons CO_2(g) + 4H_2(g)$; K_3
Which of the following relations is correct ?

(1) $K_2 K_3 = K_1$ (2) $K_3 = K_1K_2$ (3) $K_3 K_2^3 = K_1^2$ (4) $K_1\sqrt{K_2} = K_3$

Q.11 For the reaction $SO_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons SO_{3(g)}$, if $K_P = K_C(RT)^x$ where the symbols have usual meaning then the value of x is : (assuming ideality)

(1) –1 (2) $-\frac{1}{2}$ (3) $\frac{1}{2}$ (4) 1

Q.12 At constant temperature, the equilibrium constant (K_p) for the decomposition reaction $N_2O_4 \rightleftharpoons 2NO_2$ is expressed by $K_p = \frac{(4x^2P)}{(1-x^2)}$, where P = pressure, x = extent of decomposition. Which one of the following statements is true?
(1) K_p increases with increase of P (2) K_p increases with increase of x
(3) K_p increases with decrease of x (4) K_p remains constant with change in P and x

ASSERTION & REASON

Directions : Each of these questions contains an Assertion followed by reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

Q.13 **Assertion :** For the reaction,
$H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, $K_p = K_c$
Reason : K_p of all gases reactions is equal to K_c.

Q.14 **Assertion :** For the reaction, $N_2 + O_2 \rightleftharpoons 2NO$, increase in pressure at equilibrium has no effect on the reaction.
Reason : Σ moles of gaseous product – Σ moles of gaseous reactant = 0.

Q.15 **Assertion :** The reaction quotient , Q has the same form as the equilibrium constant K_{eq}, and is evaluated using any given concentrations of the species involved in the reaction, and not necessarily equilibrium concentrations.
Reason : If the numerical value of Q is not the same as the value of equilibrium constant, a reaction will occur.

Q.16 **Assertion :** A catalyst does not influences the values of equilibrium constant.
Reason : Catalysts influence the rate of both forward and backward reactions equally.

ANSWER KEY

CHEMICAL EQUILIBRIUM

Q.1	2	Q.2	4	Q.3	2	Q.4	2	Q.5	2	Q.6	1	Q.7	1
Q.8	3	Q.9	2	Q.10	2	Q.11	2	Q.12	4	Q.13	3	Q.14	1
Q.15	2	Q.16	1										