Date Planned : __ / __ / __	Daily Tutorial Sheet-2	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Advanced (Archive)	Exact Duration :_________

16. For a gaseous reaction $2B \longrightarrow A$, the equilibrium constant K_p is ...... than K_c. **(1997)**

17. The degree of dissociation is 0.4 at 400K and 1.0 atm for the gaseous reaction $PCl_5 \rightleftharpoons PCl_3 + Cl_2$. Assuming ideal behaviour of all the gases, calculate the density of equilibrium mixture at 400 K and 1.0 atm (relative atomic mass of P = 31.0 and Cl = 35.5). **(1998)**

18. For the reversible reaction, $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ **(2000)**

At $500°C$, the value of K_p is 1.44×10^{-5} when partial pressure is measured in atmosphere. The corresponding value of K_c with concentration in mol/L is:

(A) $\dfrac{1.44 \times 10^{-5}}{(0.082 \times 500)^{-2}}$ **(B)** $\dfrac{1.44 \times 10^{-5}}{(8.314 \times 773)^{-2}}$

(C) $\dfrac{1.44 \times 10^{-5}}{(0.082 \times 773)^{2}}$ **(D)** $\dfrac{1.44 \times 10^{-5}}{(0.082 \times 773)^{-2}}$

19. At constant temperature, the equilibrium constant (K_p) for the decomposition reaction, $N_2O_4 \rightleftharpoons 2NO_2$, is expressed by $K_p = \dfrac{4x^2p}{(1-x)^2}$, where p = pressure, x = extent of decomposition. Which one of the following statement is true ? **(2001)**

(A) K_p increases with increases of p **(B)** K_p increases with increases of x

(C) K_p increases with decreases of x **(D)** K_p remains constant with change in p and x

20. Consider the following equilibrium in a closed container $N_2O_4(g) \rightleftharpoons 2NO_2(g)$

At a fixed temperature, the volume of the reaction container is halved. For this change, which of the following statements hold true regarding the equilibrium constant (K_p) and degree of dissociation (α)? **(2002)**

(A) Neither K_p nor α changes **(B)** Both K_p and α changes

(C) K_p changes but α does not change **(D)** K_p does not change but α changes

21. In the following equilibrium $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ when 5 moles of each are taken, the temperature is kept at 298 K the total pressure was found to be 20 bar. Given that **(2004)**

$\Delta G_f^\circ(N_2O_4) = 100 kJ$, $\Delta G_f^\circ(NO_2) = 50$ kJ

(i) Find $\Delta G°$ of the reaction.

(ii) The direction of the reaction in which the equilibrium shifts.

22. $Ag^+ + NH_3 \rightleftharpoons [Ag(NH_3)]^+ ; K_1 = 3.5 \times 10^{-3}$ **(2006)**

$[Ag(NH_3)]^+ + NH_3 \rightleftharpoons [Ag(NH_3)_2]^+ ; K_2 = 1.7 \times 10^{-3}$

Then the formation constant of $[Ag(NH_3)_2]^+$ is:

(A) 5.95×10^{-6} **(B)** 5.95×10^{6} **(C)** 5.95×10^{-9} **(D)** None of these

***23.** The thermal dissociation of equilibrium of $CaCO_3(s)$ is studied under different conditions. **(2013)**

$$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$$

For this equilibrium, the correct statement(s) is:

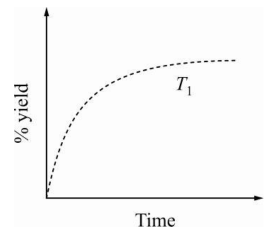
(A) ΔH is dependent on T

(B) K is independent of the initial amount of $CaCO_3$

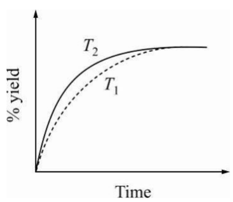
(C) K is dependent on the pressure of CO_2 at a given T

(D) ΔH is independent of the catalyst, if any

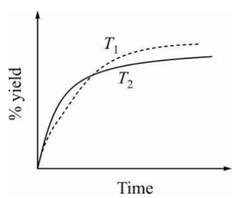
24. The %yield of ammonia as a function of time in the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g), \Delta H < 0$ at (P, T_1) is given below :



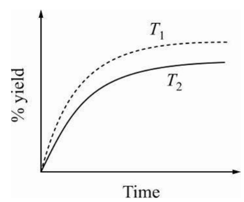
If this reaction is conducted at (P, T_2), with $T_2 > T_1$, the %yield of ammonia as a function of time represented by: **(2015)**



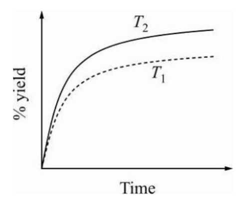
(A)



(B)



(C)



(D)

***25.** The gas phase reaction $2NO_2(g) \longrightarrow N_2O_4(g)$ is an exothermic reaction. The decomposition of N_2O_4, in equilibrium mixture of $NO_2(g)$ and $N_2O_4(g)$, can be increased by : **(2016)**

(A) lowering the temperature

(B) increasing the pressure

(C) addition of an inert gas at constant volume

(D) addition of an inert gas at constant pressure

26. $\Delta_f G^\circ$ at 500 K for substance 'S' in liquid state and gaseous state are $+100.7 \text{ kcal mol}^{-1}$ and $+103 \text{ kcal mol}^{-1}$, respectively. Vapour pressure of liquid 'S' at 500 K is approximately equal to: **(2018)**

(A) 0.1 atm **(B)** 1 atm **(C)** 10 atm **(D)** 100 atm

27. At a certain temperature in a 5 L vessel, 2 moles of carbon monoxide and 3 moles of chlorine were allowed to reach equilibrium according to the reaction, $CO + Cl_2 \rightleftharpoons COCl_2$ **(2018)**

At equilibrium, if one mole of CO is present then equilibrium constant (K_c) for the reaction is :

(A) 2 **(B)** 2.5 **(C)** 3 **(D)** 4

28. For the following reaction, the equilibrium constant K_c at 298 K is 1.6×10^{17} **(2019)**

$$Fe^{2+}(aq) + S^{2-}(aq) \rightleftharpoons FeS(s)$$

When equal volumes of 0.06 M $Fe^{2+}(aq)$ and 0.2 M $S^{2-}(aq)$ solutions are mixed, the equilibrium concentration of $Fe^{2+}(aq)$ is found to be $Y \times 10^{-17}$M. The value of Y is_______.