

Date Planned ://	Daily Tutorial Sheet-1	Expected Duration : 90 Min
Actual Date of Attempt : / /	JEE Advanced (Archive)	Exact Duration :

- 1. If equilibrium constant for the reaction,  $A_2 + B_2 \rightleftharpoons 2AB$ , is K, then for the backward reaction  $AB \rightleftharpoons \frac{1}{2}A_2 + \frac{1}{2}B_2$ , the equilibrium constant is  $\frac{1}{K}$ . (True/False) (1984)
- One mole of nitrogen is mixed with three moles of hydrogen in a four litre container. If 0.25 per cent of nitrogen is converted to ammonia by the following reaction  $N_2(g) + 3H_2(g) \Longrightarrow 2NH_3(g)$ , then calculate the equilibrium constant,  $K_c$  in concentration units. What will be the value of  $K_c$  for the following equilibrium? (1984)  $\frac{1}{2}N_2(g) + \frac{3}{2}H_2(g) \Longrightarrow NH_3(g)$
- When a liquid and its vapour are at equilibrium and the pressure is suddenly decreased, cooling occurs.(True/False)
- \*4. For the gas phase reaction,  $C_2H_4 \rightleftharpoons C_2H_6$   $(\Delta H = -32.7 \text{ kcal})$  (1984) Carried out in a vessel, the equilibrium concentration of  $C_2H_4$  can be increased by :
  - **(A)** increasing the temperature
- **(B)** decreasing the pressure

(C) removing some  $H_2$ 

- **(D)** adding some  $C_2H_6$
- The equilibrium constant of the reaction  $A_2(g) + B_2(g) \Longrightarrow 2AB(g)$  at  $100^{\circ}C$  is 50. If a one litre flask containing one mole of  $A_2$  is connected to a two litre flask containing two moles of  $B_2$ , how many moles of AB will be formed at 373 K? (1985)
- \*6. When NaNO<sub>3</sub> is heated in a closed vessel, oxygen is liberated and NaNO<sub>2</sub> is left behind. At equilibrium,
  - (A) adding of NaNO2 favours reverse reaction

(1986)

- (B) adding of NaNO<sub>3</sub> favours forward reaction
- (C) increasing temperature favours forward reaction
- **(D)** increasing pressure favours reverse reaction
- **7.** Catalyst makes a reaction more exothermic.

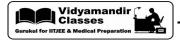
(1987)

- **8.** At a certain temperature, equilibrium constant (K<sub>c</sub>) is 16 for the reaction;
- (1987)

$$SO_2(g) + NO_2(g) \Longrightarrow SO_3(g) + NO(g)$$

If we take one mole each of all the four gases in a one litre container, what would be the equilibrium concentrations of NO and  $NO_2$ ?

- 9.  $N_2O_4$  is 25% dissociated at 37°C and one atmosphere pressure. Calculate (i)  $K_p$  and (ii) the percentage dissociation at 0.1 atm and 37°C. (1988)
- 10. The equilibrium constant  $K_p$  of the reaction,  $2SO_2(g) + O_2(g) \Longrightarrow 2SO_3(g)$  is 900 atm at 800 K. A mixture containing  $SO_3$  and  $O_2$  having initial pressure of 1 and 2 atm respectively is heated at constant volume to equilibrate. Calculate the partial pressure of each gas at 800K. (1989)



- For the reaction,  $CO(g) + 2H_2 \rightleftharpoons CH_3OH(g)$  hydrogen gas is introduced into a five litre flast at 327°C,s containing 0.2 mole of CO(g) and a catalyst, until the pressure is 4.92 atm. At this point 0.1 mole of  $CH_3OH(g)$  is formed. Calculate the equilibrium constant,  $K_p$  and  $K_c$ . (1990)
- \*12. For the reaction,  $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$  the forward reaction at constant temperature is favoured by:
  - (A) introducing an inert gas at constant volume
  - (B) introducing chlorine gas at constant volume
  - (C) increasing the volume of the container
  - (**D**) introducing PCl<sub>5</sub> at constant volume
- 13. The rate of an exothermic reaction increase with increasing temperature. (True/False) (1993)
- 14. 0.15 mole of CO taken in a 2.5L flask is maintained at 752 K along with a catalyst so that the following reaction can take place: (1993)

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

Hydrogen is introduced until the total pressure of the system is 8.5 atm at equilibrium and 0.08 mole of methanol is formed. Calculate (i)  $K_p$  and  $K_c$  and (ii) the final pressure is the same amount of CO and  $H_2$  as before are used, but with no catalyst so that the reaction does not take place.

15. A ten-fold increase in pressure on the reaction,  $N_2(g) + 3H_2(g) \Longrightarrow 2NH_3(g)$  at equilibrium, results in......in  $K_p$ . (1996)