MPOMA SCHOOL SATELLITE CAMPUS
FORM FIVE REVISION QUESTIONS
TOPIC: CHEMICAL EQUILIBRIUM

1. 0.5 mole of hydrogen and 0.5 mole of iodine react in a 10-litre evacuated vessel at 448°C; hydrogen iodide is formed. The equilibrium constant, Kc for the reaction is 50.

(a) Calculate the number of moles of iodine which remain unreacted at equilibrium.
(b) What is the value of Kc?

2. The equilibrium constant of the reaction, A_2 (g)+B_2(g) ⇌2AB(g) at 100°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?
3. 3 g mole of phosphorus pentachloride is heated in a flask of 4 litre volume. At equilibrium it dissociates to give 40% of phosphorus trichloride and chlorine. Calculate the equilibrium constant.
4. One mole of nitrogen and three moles of hydrogen are mixed in a 4litre container. If 0.25 per cent of nitrogen is converted to ammonia by the following reaction:
   $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
   calculate the equilibrium constant (Kc) in terms of concentration units.
5. In an experiment one mole of acetic acid and one mole of alcohol were allowed to react until equilibrium was established. The equilibrium mixture was found to contain 2/3 mole of ester. Calculate the equilibrium constant of the reaction.
6. 3.2 mole of HI were heated in a sealed bulb at 444°C till the equilibrium state was reached. Its degree of dissociation was found to be 20%. Calculate the number of moles of hydrogen iodide, hydrogen and iodine present at the equilibrium point and determine the equilibrium constant.
7. 3moles of phosphorus pentachloride is heated in a flask of 4 litre volume. At equilibrium it dissociates to give 40% of phosphorus trichloride and chlorine. Calculate the equilibrium constant.

8. When 3 moles of hydrogen and 1 mole of nitrogen were mixed and allowed to attain equilibrium at 100atms at 400^0C, the equilibrium mixture contained 25% of ammonia by volume. Calculate the value of Kc.

9. 5.00 mol H_2 and 3.00 mol I_2 are mixed together in a vessel of volume 10.0 dm^3 and allowed to come to equilibrium at 1100 K. At equilibrium there were 0.43 mol I_2 present in the reaction mixture. Calculate the value of the equilibrium constant.

10. 3.00 mol NO_2 and 1.00 mol N_2O_4 are mixed together in a vessel of volume 1.00 dm^3 and allowed to come to equilibrium at 398 K. At equilibrium there were 1.74 mol N_2O_4 present in the reaction mixture. Calculate the value of the equilibrium constant. The equation for the reaction is: $2NO_2(g) \rightleftharpoons N_2O_4(g)$.
11. Consider the reaction $H_2(g) + CO_2(g) \rightleftharpoons H_2O(g) + CO(g)$. In this reaction, 2.00 mol H_2 and 2.00 mol CO_2 are put into a container of volume 10.0 dm^3 together with 1.00 mol H_2O and 1.00 mol CO. They are allowed to come to equilibrium at 1200 K. Given that the value of the equilibrium constant at 1200 K is 2.10, work out the composition of the equilibrium mixture in terms of concentrations.