SAMPLE QUESTIONS

CHEMICAL EQUILIBRIUM

1. Write down the Kc expression of the following reactions.

A. $3\ Fe(s) + 4\ H_2O(g) \Leftrightarrow Fe_3O_4(s) + 4\ H_2(g)$ Kc =

B. $H_2O(g) + CO(g) + 22\ kcal \Leftrightarrow H_2(g) + CO_2(g)$ Kc =

C. $H_2(g) + I_2(g) \Leftrightarrow 2\ HI(g)$ Kc =

D. $H_2(g) \Leftrightarrow H_2(I)$ Kc=

2. The equilibrium constant for the reaction:

$$2NO(g) \Leftrightarrow N_2(g) + O_2(g)$$

is 2.60×10^{-3} at 1100 °C. If 0.8 mole of NO (g) and 0.2 mole each of N_2 (g) and O_2 (g) are mixed in a 1.00 liter container at 1100 °C, what are the concentrations of NO (g), N_2(g), and O_2 (g) at equilibrium?

3. A 3 mol sample of $N_2O_5$was placed and heated in a 1-L vessel. Some of N_2O_5 decomposed according to the reaction;

$$2N_2O_5(g) \Leftrightarrow 4NO_2(g) + O_2(g)$$

At equilibrium the mole number of O_2 gas was found to be 0.25 mol. Calculate the value of Kc for this reaction.

5. Write Kp and Kc relationships for the following reactions.

A. $2H_2O(g) + 2Br_2(g) \Leftrightarrow 4HBr(g) + O_2(g)$ .....

B. $CO_2(g) \Leftrightarrow CO_2(s)$ .....

C. $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$ .....

D. $2Ca(s) + 2H_2O(g) \Leftrightarrow 2Ca(OH)_2(aq) + H_2(g)$ .....

E. $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$ .....

4. At a certain temperature:

(I) $SO_3(g) + NO(g) \Leftrightarrow SO_2(g) + NO_2(g)$ $Kc_1 = 0.25$

(II) $NO(g) + 1/2O_2(g) \Leftrightarrow NO_2(g)$ $Kc_2 = 2$

Find the value of Kc for the reaction below at the same temperature.

$SO_2(g) + 1/2O_2(g) \Leftrightarrow SO_3(g)$ Kc = ?

6. Complete the following table by using arrows (←,→,↑,↓) according to reaction below when following changes applied. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g) + 92\ kJ$

Changes	**Direction of reaction (←,→)**	**[N_2] (↑,↓)**	**[H_2] (↑,↓)**	**[NH_3] (↑,↓)**
Increase in [H_2]			X	
Decrease volume				
Increase temperature				