

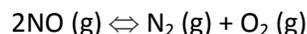
## SAMPLE QUESTIONS

### CHEMICAL EQUILIBRIUM

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

- A.  $3 \text{Fe(s)} + 4 \text{H}_2\text{O(g)} + \rightleftharpoons \text{Fe}_3\text{O}_4\text{(s)} + 4 \text{H}_2\text{(g)}$  Kc =
- B.  $\text{H}_2\text{O(g)} + \text{CO(g)} + 22 \text{ kcal} \rightleftharpoons \text{H}_2\text{(g)} + \text{CO}_2\text{(g)}$  Kc =
- C.  $\text{H}_2\text{(g)} + \text{I}_2\text{(g)} \rightleftharpoons 2 \text{HI(g)}$  Kc =
- D.  $\text{H}_2\text{(g)} \rightleftharpoons \text{H}_2\text{(l)}$  Kc =

2. The equilibrium constant for the reaction:



is  $2.60 \times 10^{-3}$  at  $1100^\circ\text{C}$ . If 0.8 mole of NO (g) and 0.2 mole each of  $\text{N}_2$  (g) and  $\text{O}_2$  (g) are mixed in a 1.00 liter container at  $1100^\circ\text{C}$ , what are the concentrations of NO (g),  $\text{N}_2$ (g), and  $\text{O}_2$  (g) at equilibrium?

3. A 3 mol sample of  $\text{N}_2\text{O}_5$  was placed and heated in a 1-L vessel. Some of  $\text{N}_2\text{O}_5$  decomposed according to the reaction;

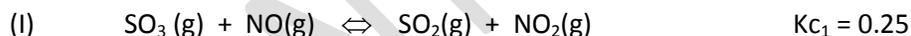


At equilibrium the mole number of  $\text{O}_2$  gas was found to be 0.25 mol. Calculate the value of Kc for this reaction.

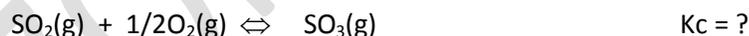
5. Write Kp and Kc relationships for the following reactions.

- A.  $2\text{H}_2\text{O(g)} + 2\text{Br}_2\text{(g)} \rightleftharpoons 4\text{HBr(g)} + \text{O}_2\text{(g)}$  .....
- B.  $\text{CO}_2\text{(g)} \rightleftharpoons \text{CO}_2\text{(s)}$  .....
- C.  $\text{N}_2\text{(g)} + \text{O}_2\text{(g)} \rightleftharpoons 2\text{NO(g)}$  .....
- D.  $2\text{Ca(s)} + 2\text{H}_2\text{O(g)} \rightleftharpoons 2\text{Ca(OH)}_2\text{(aq)} + \text{H}_2\text{(g)}$  .....
- E.  $\text{N}_2\text{(g)} + \text{O}_2\text{(g)} \rightleftharpoons 2\text{NO(g)}$  .....

4. At a certain temperature:



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



6. Complete the following table by using arrows ( $\leftarrow$ ,  $\rightarrow$ ,  $\uparrow$ ,  $\downarrow$ ) according to reaction below when following changes applied.



Changes	Direction of reaction ( $\leftarrow$ , $\rightarrow$ )	$[\text{N}_2]$ ( $\uparrow$ , $\downarrow$ )	$[\text{H}_2]$ ( $\uparrow$ , $\downarrow$ )	$[\text{NH}_3]$ ( $\uparrow$ , $\downarrow$ )
Increase in $[\text{H}_2]$			X	
Decrease volume				
Increase temperature				