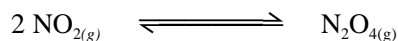
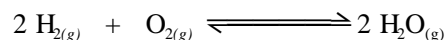


6. Nitrogen dioxide is a dark brown gas, which can decompose to form colourless dinitrogen tetroxide. The mixture of these two gases will eventually reach equilibrium.



Which of the following statements is **not** true?

- A. At equilibrium, both of these reactions have ceased.
 B. At equilibrium the colour of the gas mixture would remain constant.
 C. At equilibrium, the rate of decomposition of NO_2 to N_2O_4 equals its rate of formation.
 D. At equilibrium, the quantities of NO_2 and N_2O_4 remain the same.
7. The equilibrium constant, K_c , for the reaction:



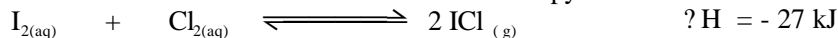
is equal to 2×10^{81} at 25°C . This value suggests that:

- A. this reaction favours the forward reaction slightly more than the reverse reaction.
 B. this reaction favours the reverse reaction slightly more than the forward reaction.
 C. this reaction virtually goes to completion with little reversal.
 D. this reaction virtually does not proceed forward and largely favours the reactants.

8. Consider the reaction: $2\text{NO}_{2(g)} \rightleftharpoons \text{N}_2\text{O}_{4(g)}$

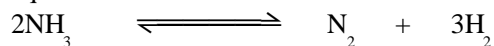
What would happen to the value of K_c , in the above reaction, if the pressure of the N_2O_4 is doubled?

- A. K_c would not be affected. B. K_c would be halved.
 C. K_c would be doubled. D. K_c would increase by a factor of 4.
9. Consider the reaction of iodine and chlorine for which the enthalpy of reaction is -27 kJ .



At 25°C , $K_c = 1.6 \times 10^5$. If the temperature increased to 100°C , what changes (if any) will be observed?

- A. K_c will increase B. no changes
 C. $[\text{ICl}]$ will increase D. $[\text{I}_2]$ will increase
10. The value of the equilibrium constant for the reaction:



is 2.5×10^{-9} at 25°C . The value of the equilibrium constant for the **reverse** reaction at the same temperature is:

- A. 2.5×10^{-9} B. 4.0×10^8 C. 2.0×10^4 D. 4.0×10^9

Multiple Choice Answers

1	2	3	4	5	6	7	8	9	10

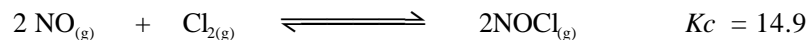
Application (16)

1. The equilibrium constant for the following reaction is 0.110



Calculate all the equilibrium concentrations if 0.33 mol of iodine chloride gas, $\text{ICl}_{(g)}$, is placed in a 1.00 L vessel and the reaction is allowed to reach equilibrium. 5

2. The following reaction occurs readily at 425 °C:



The equilibrium constant, K_c , is 14.9 at this temperature.

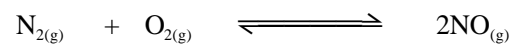
Suppose a reaction vessel at this temperature contained these three gases at the following concentrations: $[\text{NO}] = 0.0500 \text{ mol/L}$, $[\text{Cl}_2] = 0.100 \text{ mol/L}$, $[\text{NOCl}] = 0.100 \text{ mol/L}$

- (a) Show that the system is not at equilibrium.

3

(b) Predict the shift that the reaction would take to establish equilibrium. Briefly justify your answer. 3

3. In air at 25 °C and 101.1 kPa, the N₂ concentration is 0.0330 mol/L and the O₂ concentration is 0.00810 mol/L. The reaction:



has $K_c = 4.80 \times 10^{-31}$ at 25 °C. Taking the N₂ and O₂ concentrations above as initial values, calculate the concentration of NO gas when equilibrium is established at 25 °C. 5