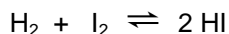




STARTER FOR 10...

8.1. Dynamic equilibria

This question is about the equilibrium established between hydrogen, iodine and hydrogen iodide;



1. (a) If the system is at equilibrium, indicate whether the statements below are **True** or **False**; (6 marks)

The rate of the forward and backward reaction must be the same

The concentration of the reactants and products is the same

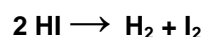
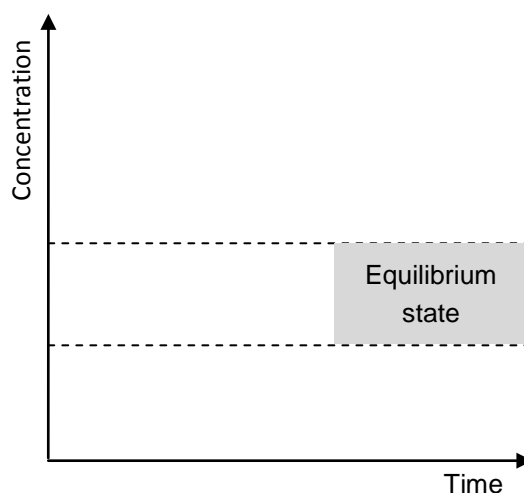
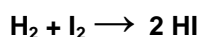
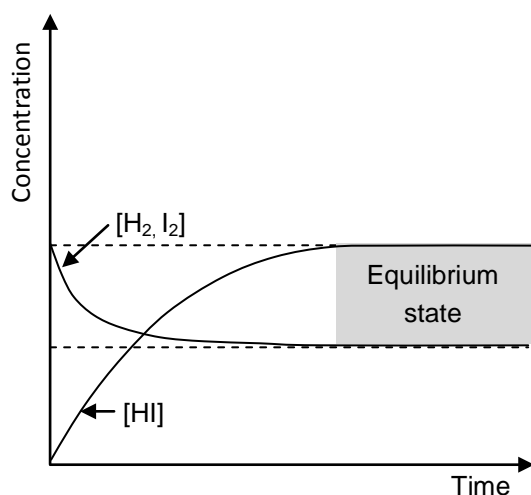
The equilibrium must have been established by reacting hydrogen with iodine

The system must be sealed

Iodine is purple in colour. Hydrogen and hydrogen iodide are colourless. Therefore as the iodine is used up, the colour of the system will gradually fade.

The pressure of the system will remain constant

- (b) The diagram on the left below shows how the concentration of reactants and products changes when the equilibrium is established from an equimolar mixture of hydrogen and iodine. Draw an equivalent diagram on the axes on the right to show how the concentration of reactants and products would change if the equilibrium was established from pure hydrogen iodide under the same conditions.



(4 marks)



STARTER FOR 10!!!

8. Equilibria answers

8.1. Dynamic equilibria

1. (a) The rate of the forward and backward reaction must be the same – **True**

The concentration of the reactants and products is the same – **False** (they remain constant)

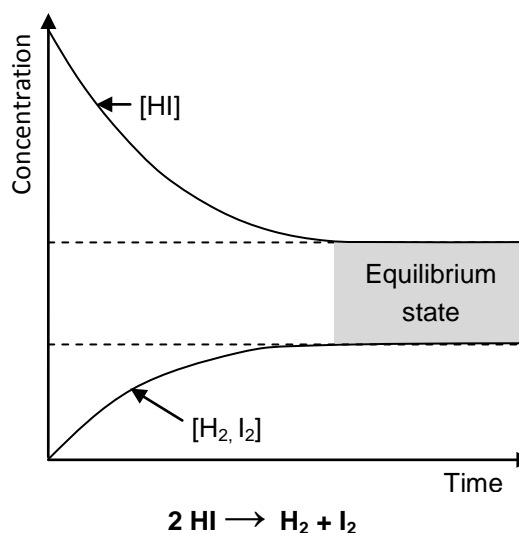
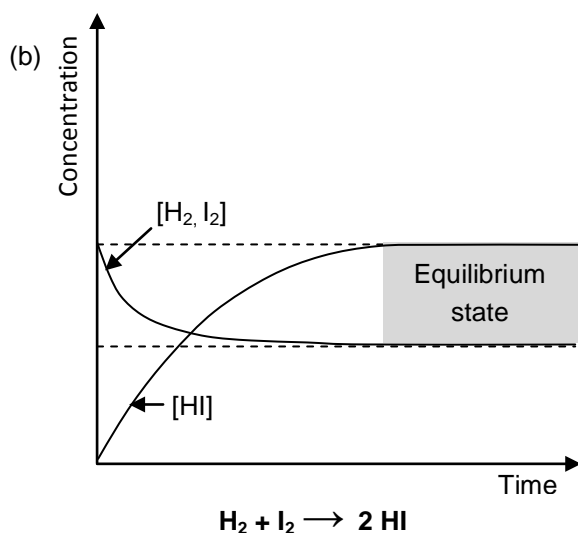
The equilibrium must have been established by reacting hydrogen with iodine – **False**

The system must be sealed – **True**

Iodine is purple in colour. Hydrogen and hydrogen iodide are colourless. Therefore as the iodine is used up, the colour of the system will gradually fade – **False** (the concentration of I_2 doesn't change)

The pressure of the system will remain constant – **True**

(6 marks)



(2 marks given for the correct start and end point of each curve)

8.2. Dynamic equilibria

1. $Cl_2(aq) + H_2O(l) \rightleftharpoons HClO(aq) + HCl(aq)$

Possible disturbances which would result in a decrease in the concentration of chlorine are removal of either of the products from the system or addition of water to the system. (2 marks for any two)

2. $4 HCl + O_2 \rightleftharpoons 2 Cl_2 + 2 H_2O \quad \Delta H \text{ -ive}$

Possible disturbances which would result in an increase in the concentration of chlorine are an increase in the concentration of either of the reactants, removal of water from the system or cooling the system. (2 marks for any two)

3. $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g) \quad \Delta H \text{ +ive}$