AQA GCSE Chemistry Worksheet

Reversible Reactions and Dynamic Equilibrium | Higher Tier | 4.6.2

HIGHER TIER

Student Name: _____ Date: _____ **Total: 30 marks**

1. **[1 mark]**

What is the symbol used to represent a reversible reaction?

2. **[2 marks]**

Define the term 'dynamic equilibrium'.

3. **[2 marks]**

Hydrated copper(II) sulfate is heated. State the colour change that occurs and whether the reaction is exothermic or endothermic.

4. **[2 marks]**

State Le Chatelier's Principle.

5. **[2 marks]**

Consider the reaction: A + B ⇌ C + D. If the concentration of A is increased, what will happen to the equilibrium position? Explain your answer.

6. **[3 marks]**

Nitrogen reacts with hydrogen to form ammonia: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$. The forward reaction is exothermic. Explain the effect on the equilibrium yield of ammonia if the temperature is decreased.

7. **[3 marks]**

For the same reaction ($N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$), explain the effect on the equilibrium yield of ammonia if the pressure is increased.

8. **[2 marks]**

Hydrogen reacts with iodine to form hydrogen iodide: $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$. Explain why changing the pressure has no effect on the equilibrium yield of hydrogen iodide.

9. **[6 marks]**

Methanol is produced industrially by the reaction of carbon monoxide with hydrogen: $CO(g) + 2H_2(g) \rightleftharpoons CH_3OH(g)$. The forward reaction is exothermic. Predict the conditions of temperature and pressure that would give the maximum equilibrium yield of methanol. Explain your choices.

10. **[4 marks]**

A student investigates the equilibrium between two different coloured cobalt compounds: $[Co(H_2O)_6]^{2+}$ (pink) + $4Cl^- \rightleftharpoons [CoCl_4]^{2-}$ (blue) + $6H_2O$. The forward reaction is endothermic. Describe and explain what you would observe if a test tube containing the equilibrium mixture is placed in a beaker of hot water.

11. **[3 marks]**

In the industrial production of sulfuric acid, one step is the reversible reaction: $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$. The forward reaction is exothermic. The reaction is carried out at a pressure of 1-2 atmospheres and a temperature of 450°C. Evaluate these conditions in terms of equilibrium yield and reaction rate.