

Reversible Reactions Equilibrium

GCSE Chemistry · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Describe what you would see when blue hydrated copper(II) sulfate is heated, and when water is then added to the product. (3 marks)

Step 1 · Heating

The blue crystals turn to a white powder (anhydrous copper(II) sulfate) is driven off.

Step 2 · Adding water

The white powder turns blue again and gets hot.

Step 3 · Equation

hydrated copper(II) sulfate $\rightleftharpoons$ anhydrous copper(II) sulfate + water

Answer: Blue $\rightarrow$ white on heating; white $\rightarrow$ blue (and hot) with water

Check: The reverse reaction is exothermic because the forward one is endothermic.

2. Now try one with the steps

Explain what is meant by dynamic equilibrium. (2 marks)

Step 1 · Rates

Step 2 · Amounts

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Give the symbol used for a reversible reaction. [1]

2. Write the word equation for the reversible decomposition of ammonium chloride. [1]

3. Describe what you see when water is added to white anhydrous copper(II) sulfate. [2]

4. The forward reaction of a reversible reaction takes in 78 kJ of energy. State the energy released by the reverse reaction, in kJ, for the same amount. [1]
5. Explain what is meant by dynamic equilibrium. [2]
6. State why equilibrium can only be reached in a closed system. [1]
7. State Le Chatelier's principle. [1]
8. For $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$, state the total number of gas molecules on the left-hand side. [1]
9. For $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$, explain the effect of increasing pressure on the yield of ammonia. [2]
10. For $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ (forward exothermic), explain the effect of decreasing the temperature on the yield of ammonia. [2]
11. Explain why changing the pressure has no effect on the position of equilibrium for $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$. [2]
12. For $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$, predict the effect of adding more nitrogen. [1]
13. N_2O_4 (colourless) $\rightleftharpoons 2\text{NO}_2$ (brown); the forward reaction is endothermic. Predict and explain the colour change on heating. [2]

14. Explain the effect of a catalyst on the position of equilibrium.

[1]

4. Before you hand it in

"At equilibrium the reactions have stopped."

Both reactions continue at equal rates; amounts stay constant.

"At equilibrium there are equal amounts of reactants and products."

The position can lie far to the left or right.

Counting all molecules including solids or liquids

Count only gas molecules on each side.

"A catalyst increases the yield."

A catalyst only makes equilibrium reached faster.