
HL Paper 1

Which variable affects the equilibrium constant, K_c ?

- A. Atmospheric pressure
- B. Catalyst
- C. Concentration of reactants
- D. Temperature

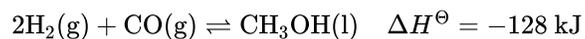
Markscheme

D

Examiners report

[N/A]

What is the effect of an increase of temperature on the yield and the equilibrium constant for the following reaction?



	Yield	Equilibrium constant
A.	Increases	Increases
B.	Increases	Decreases
C.	Decreases	Increases
D.	Decreases	Decreases

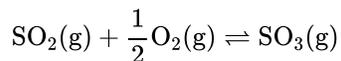
Markscheme

D

Examiners report

[N/A]

Which statements explain why a catalyst is used in the Contact process (shown below)?



- I. A catalyst lowers the activation energy.
- II. A catalyst moves the position of equilibrium towards the product.
- III. A catalyst allows the same rate to be achieved at a lower temperature.

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

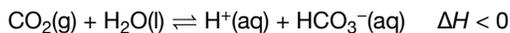
Markscheme

B

Examiners report

There were a number of comments suggesting that the sentence “A catalyst creates a new reaction pathway of lower activation energy.” should have been used. The examiners accept the rebuke. Nevertheless, nearly 85% of the candidates saw past the poor wording and gave B as the correct answer.

What is the effect of increasing the temperature in this reaction?



- A. The pH will decrease.
- B. The pH will increase.
- C. CO₂ pressure will decrease.
- D. The equilibrium position will shift to the right.

Markscheme

B

Examiners report

[N/A]

Which statement is correct for the equilibrium $\text{H}_2\text{O}(l) \rightleftharpoons \text{H}_2\text{O}(g)$ in a closed system at $100\text{ }^\circ\text{C}$?

- A. All the $\text{H}_2\text{O}(l)$ molecules have been converted to $\text{H}_2\text{O}(g)$.
- B. The rate of the forward reaction is greater than the rate of the reverse reaction.
- C. The rate of the forward reaction is less than the rate of the reverse reaction.
- D. The pressure remains constant.

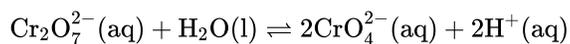
Markscheme

D

Examiners report

One respondent stated that candidates had to assume that equilibrium has been established since the question does not make this clear. It was felt that this is clearly implied in the question by stating that the container was closed and at constant temperature.

Consider the following reversible reaction.



What will happen to the position of equilibrium and the value of K_c when more H^+ ions are added at constant temperature?

	Position of equilibrium	Value of K_c
A.	shifts to the left	decreases
B.	shifts to the right	increases
C.	shifts to the right	does not change
D.	shifts to the left	does not change

Markscheme

D

Examiners report

[N/A]

The enthalpy change for the dissolution of NH_4NO_3 is $+26\text{ kJ mol}^{-1}$ at $25\text{ }^\circ\text{C}$. Which statement about this reaction is correct?

- A. The reaction is exothermic and the solubility decreases at higher temperature.
- B. The reaction is exothermic and the solubility increases at higher temperature.

C. The reaction is endothermic and the solubility decreases at higher temperature.

D. The reaction is endothermic and the solubility increases at higher temperature.

Markscheme

D

Examiners report

[N/A]

What occurs when the pressure on the given equilibrium is increased at constant temperature?



- A. K_c increases and the position of equilibrium moves to the right.
- B. K_c stays the same and the position of equilibrium is unchanged.
- C. K_c stays the same and the position of equilibrium moves to the left.
- D. K_c decreases and the position of equilibrium moves to the left.

Markscheme

B

Examiners report

[N/A]

Which of the following will shift the position of equilibrium to the right in the Haber process?



- I. Decreasing the concentration of $\text{NH}_3(\text{g})$
 - II. Decreasing the temperature
 - III. Increasing the pressure
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

Markscheme

D

Examiners report

[N/A]
