

17.1 The Equilibrium Law

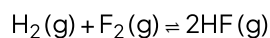
Question Paper

Course	DP IB Chemistry
Section	17. Equilibrium (HL only)
Topic	17.1 The Equilibrium Law
Difficulty	Easy

Time allowed: 10
Score: /5
Percentage: /100

Question 1

Which is the correct K_c expression for the reaction between hydrogen and fluorine?

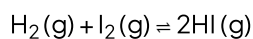


- A. $\frac{[\text{HF}]^2}{[\text{H}_2][\text{F}_2]}$
- B. $\frac{[\text{HF}]}{[\text{H}_2][\text{F}_2]}$
- C. $\frac{2[\text{HF}]}{[\text{H}_2][\text{F}_2]}$
- D. $\frac{[\text{H}_2][\text{F}_2]}{[\text{HF}]^2}$

[1 mark]

Question 2

The K_c expression for the following reaction between hydrogen and iodine is shown



$$K_c = \frac{[\text{HI}]^2}{[\text{H}_2][\text{I}_2]}$$

At equilibrium there were 0.234 moles of HI, 0.150 moles of H_2 and 0.025 moles of I_2 .

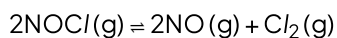
Which is the correct K_c expression for the reaction between hydrogen and fluorine?

- A. $\frac{[0.234]^2}{[0.15][0.025]}$
- B. $\frac{[0.234]}{[0.15][0.025]}$
- C. $\frac{[0.15][0.025]}{[0.234]^2}$
- D. $\frac{[0.15][0.025]}{[0.234]}$

[1 mark]

Question 3

Nitrosyl chloride decomposes into nitrogen monoxide and chlorine according to the following equation. The forward reaction is endothermic



Which change in condition would change the value for K_c ?

- A. Decreasing the pressure
- B. Adding a catalyst
- C. Increasing the temperature
- D. Increasing the pressure

[1 mark]

Question 4

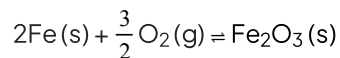
Which of the following rows correctly describes K_c and ΔG for a reaction where the products are favoured?

	K_c	ΔG
A.	> 1	< 1
B.	> 1	< 0
C.	> 0	> 0
D.	> 0	> 1

[1 mark]

Question 5

At 300 K, iron oxidises according to the following equation:



The standard Gibbs free energy change for this reaction is $-743.05 \text{ kJ mol}^{-1}$.

The quantitative relationship between the standard Gibbs free energy change, temperature and the equilibrium constant is:

$$\Delta G = -RT \ln K$$

Which expression is a correct step towards calculating the value of the equilibrium constant? ($R = 8.31 \text{ J K}^{-1} \text{ mol}^{-1}$)

A. $\ln K = \frac{8.31 \times 573}{-743.05 \times 10^3}$

B. $\ln K = \frac{8.31 \times 300}{-743.05 \times 10^3}$

C. $\ln K = \frac{-743.05}{8.31 \times 300}$

D. $\ln K = \frac{-743.05 \times 10^3}{8.31 \times 300}$

[1 mark]