

# 17.1 The Equilibrium Law

## Question Paper

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

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

### Question 1

When gaseous dinitrogen pentoxide,  $\text{N}_2\text{O}_5(\text{g})$ , decomposes at 358 K, the following equilibrium is established:



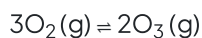
2.0 mol of  $\text{N}_2\text{O}_5(\text{g})$  were placed in a  $1.0 \text{ dm}^3$  container and allowed to reach equilibrium. At equilibrium 1.0 mol of  $\text{N}_2\text{O}_5(\text{g})$  were present. What is the value of  $K_c$ ?

- A. 0.125
- B. 1
- C. 2
- D. 8

[1 mark]

### Question 2

Consider the following reversible reaction:



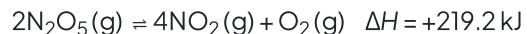
What is the value of  $K_c$  when the equilibrium concentrations are  $[\text{O}_2] = 4.0 \text{ mol dm}^{-3}$  and  $[\text{O}_3] = 4.0 \text{ mol dm}^{-3}$ ?

- A. 0.25
- B. 4
- C. 16
- D. 64

[1 mark]

### Question 3

Which of the following will shift the position of equilibrium to the right in the reaction shown?



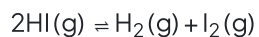
- I. Decreasing the concentration of  $\text{NO}_2(\text{g})$
- II. Decreasing the temperature
- III. Decreasing the pressure

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

[1 mark]

### Question 4

Hydrogen iodide decomposes to form hydrogen and iodine vapour.



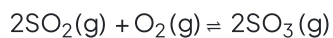
What is the effect of decreasing the volume of the equilibrium mixture at constant temperature?

- A. The amount of  $\text{H}_2(\text{g})$  remains the same but its concentration decreases
- B. The forward reaction is favoured
- C. The backward reaction is favoured
- D. The value of  $K_c$  remains unchanged

[1 mark]

**Question 5**

A mixture of 0.40 mol of  $\text{SO}_2(\text{g})$  and 0.40 mol of  $\text{O}_2(\text{g})$  was placed in a  $1 \text{ dm}^3$  container. The following equilibrium took place:



At equilibrium the mixture contained 0.25 mol of  $\text{O}_2(\text{g})$ . How many moles of  $\text{SO}_2(\text{g})$  and  $\text{SO}_3(\text{g})$  were present at equilibrium?

	$\text{SO}_2(\text{g}) / \text{mol}$	$\text{SO}_3(\text{g}) / \text{mol}$
<b>A</b>	0.25	0.15
<b>B</b>	0.30	0.15
<b>C</b>	0.10	0.30
<b>D</b>	0.25	0.30

[1 mark]