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, $N_2O_5(g)$, decomposes at 358 K, the following equilibrium is established:

$$2N_2O_5(g) \rightleftharpoons 4NO_2(g) + O_2(g)$$

2.0 mol of $N_2O_5(g)$ were placed in a 1.0 dm^3 container and allowed to reach equilibrium. At equilibrium 1.0 mol of $N_2O_5(g)$ 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:

$$3O_2(g) \rightleftharpoons 2O_3(g)$$

What is the value of K_c when the equilibrium concentrations are $[O_2] = 4.0$ mol dm^{-3} and $[O_3] = 4.0$ mol dm^{-3}?

A. 0.25

B. 4

C. 16

D. 64

[1 mark]

Question 3

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

$$2N_2O_5(g) \rightleftharpoons 4NO_2(g) + O_2(g) \quad \Delta H = +219.2\,kJ$$

I. Decreasing the concentration of $NO_2(g)$
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.

$$2HI(g) \rightleftharpoons H_2(g) + I_2(g)$$

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

A. The amount of $H_2(g)$ 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 $SO_2(g)$ and 0.40 mol of $O_2(g)$ was placed in a 1 dm^3 container. The following equilibrium took place:

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$$

At equilibrium the mixture contained 0.25 mol of $O_2(g)$ .How many moles of $SO_2(g)$ and $SO_3(g)$ were present at equilibrium?

	$SO_2(g)$ / mol	$SO_3(g)$ / mol
A	0.25	0.15
B	0.30	0.15
C	0.10	0.30
D	0.25	0.30

[1 mark]