

## Equilibrium Test

1 Consider the equilibrium:  $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$

What is the effect of decreasing the pressure on the position of equilibrium and the value of the equilibrium constant,  $K_c$ ?

- A The position of equilibrium shifts to the right and  $K_c$  increases
- B The position of equilibrium shifts to the left and  $K_c$  decreases
- C The position of equilibrium is unchanged and  $K_c$  does not change
- D The position of equilibrium shifts to the left and  $K_c$  stays the same

2 Consider the equilibrium



What is the effect of increasing the temperature on the position of equilibrium and the value of the equilibrium constant,  $K_c$ ?

- A The position of equilibrium shifts to the right and  $K_c$  increases
- B The position of equilibrium shifts to the left and  $K_c$  decreases
- C The position of equilibrium is unchanged and  $K_c$  does not change
- D The position of equilibrium shifts to the left and  $K_c$  stays the same

3 Explain what is meant by the term *dynamic equilibrium*. [2]

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4  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}) \quad \Delta H = -92 \text{ kJ mol}^{-1}$

State and explain the effect of introducing an iron catalyst on the position of equilibrium and the value of the equilibrium constant,  $K_c$ ? [3]

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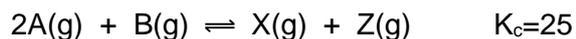
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5 Consider the reversible reaction  $\text{A}(\text{g}) + 2\text{B}(\text{g}) \rightleftharpoons 2\text{C}(\text{g}) + \text{D}(\text{g})$

2.0 mol A and 2.0 mol of B are put in a reaction vessel of volume  $5 \text{ dm}^3$  and allowed to come to equilibrium. At equilibrium there were 1.6 mol of A present. Calculate the value of the equilibrium constant. [3]

## Equilibrium Test

- 6 Consider the following reversible reaction at 300K



A and B are introduced into a reaction vessel of volume  $10 \text{ dm}^3$ . At a certain point in time the number of moles of each species present is given in the table.

Species	Number of moles
A	0.10
B	0.30
X	0.20
Z	0.20

State and explain whether the system is at equilibrium or not.

[2]

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- 7 Consider the reversible reaction:  $A(g) + B(g) \rightleftharpoons C(g) + D(g)$   $K_c=1.20$  at 300 K

(a) 1.00 mol A, 1.00 mol of B, 2.00 mol C and 2.00 mol D were introduced into a reaction vessel of volume  $1.00 \text{ dm}^3$  and allowed to come to equilibrium. Calculate the number of moles of A present at equilibrium. [3]

(b) Calculate the value of  $\Delta G$  for this reaction at 300 K.

[2]