

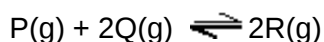
Name of the Student: _____

Max. Marks : 28 Marks

Time : 28 Minutes

Q1.

The following dynamic equilibrium was established at temperature T in a closed container.



$$\Delta H^\circ = -50 \text{ kJ mol}^{-1}$$

The value of K_c for the reaction was $68.0 \text{ mol}^{-1} \text{ dm}^3$ when the equilibrium mixture contained 3.82 mol of **P** and 5.24 mol of **R**.

- (a) Give the meaning of the term *dynamic equilibrium*.

(2)

- (b) Write an expression for K_c for this reaction.

(1)

- (c) The volume of the container was 10.0 dm^3 .

Calculate the concentration, in mol dm^{-3} , of **Q** in the equilibrium mixture.

(16)

- (d) State the effect, if any, on the equilibrium amount of **P** of increasing the temperature. All other factors are unchanged.

(1)

- (e) State the effect, if any, on the equilibrium amount of **P** of using a container of larger volume. All other factors are unchanged.

(1)

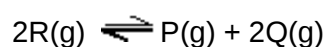
- (f) State the effect, if any, on the value of K_c of increasing the temperature. All other factors are unchanged.

(1)

- (g) State the effect, if any, on the value of K_c of using a container of larger volume. All other factors are unchanged.

(1)

- (h) Deduce the value of the equilibrium constant, at temperature T , for the reaction



(1)

(Total 24 marks)

Q2.

- (a) In an experiment, at a fixed temperature, an equilibrium mixture contained the following amounts, in moles, of each component.

$\text{CH}_3\text{CH}_2\text{COOH}$	$\text{CH}_3\text{CH}_2\text{OH}$	$\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_3$	H_2O
0.0424	0.0525	0.0745	0.0813

Use the data in the table above to calculate a value for the equilibrium constant, K_c , at this fixed temperature.

Record your answer to the appropriate precision.

(2)

- (b) If the mixture is uncovered during the time it is left to reach equilibrium, some of the ester formed will evaporate.

Explain why a smaller volume of sodium hydroxide would then be required in the titration compared with the volume for the covered mixture.

(2)

(Total 4 marks)