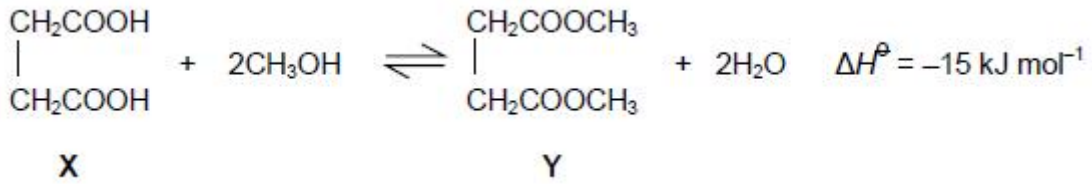
Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Chemical Equilibria, Le Chatelier's Principle And Kc

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Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

Acid **X** reacts with methanol to form an ester **Y**.



(a) Write an expression for the equilibrium constant, K_c, for this reaction. Use **X** and **Y** in your expression.

_____

_____

(1)

(b) A mixture of 0.32 mol of acid **X** and 0.84 mol of CH_3OH was allowed to reach equilibrium in the presence of a small amount of catalyst.
The equilibrium mixture formed contained 0.26 mol of ester **Y**.

Calculate the amounts, in moles, of **X**, CH_3OH and H_2O in this equilibrium mixture.

Amount of **X** _____

Amount of CH_3OH _____

Amount of H_2O _____

(3)

(c) Calculate the value of K_c and state the units.

K_c _____ units _____

(3)

(d) Predict the effect on K_c if the reaction is carried out at a lower temperature.

_____

(1)

(Total 8 marks)

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Q2.

Colourless solutions of **X**(aq) and **Y**(aq) react to form an orange solution of **Z**(aq) according to the following equation.

$$\mathbf{X}(aq) + 2\mathbf{Y}(aq) \rightleftharpoons \mathbf{Z}(aq) \quad \Delta H = -20 \text{ kJ mol}^{-1}$$

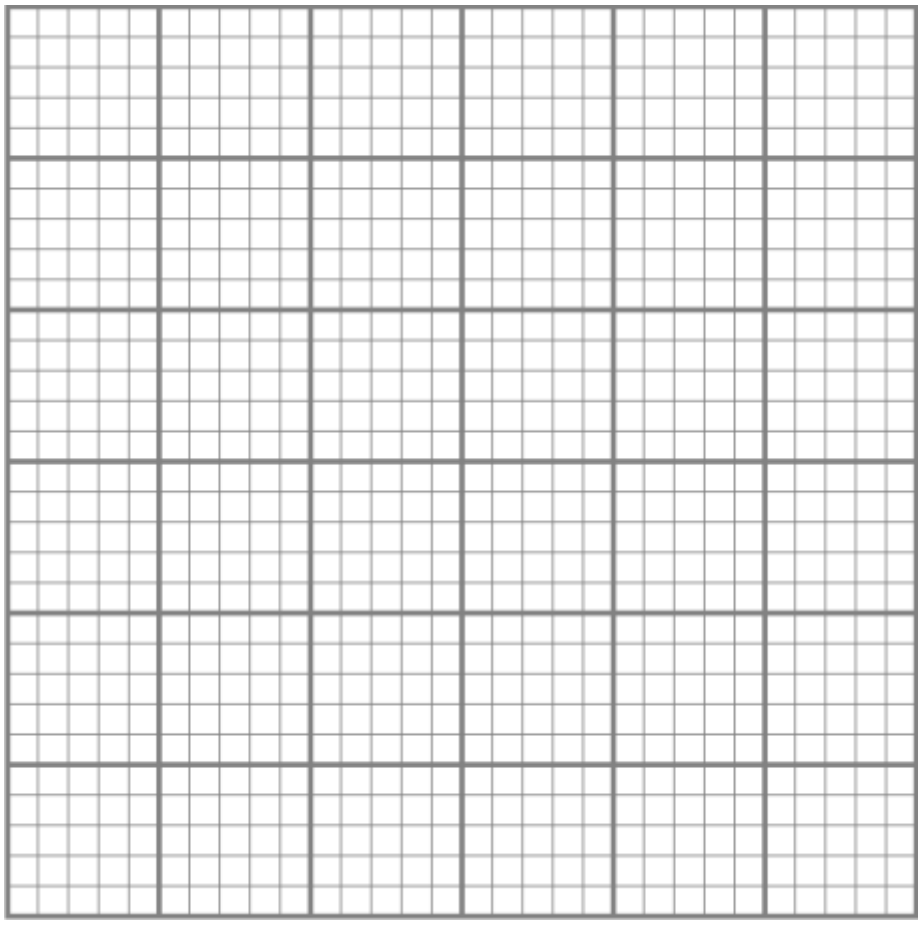
A student added a solution containing 0.50 mol of **X**(aq) to a solution containing 0.50 mol of **Y**(aq) and shook the mixture.
After 30 seconds, there was no further change in colour.
The amount of **Z**(aq) at equilibrium was 0.20 mol.

(a) Deduce the amounts of **X**(aq) and **Y**(aq) at equilibrium.

Amount of **X**(aq) = _____ mol Amount of **Y**(aq) = _____ mol

(2)

(b) On the grid below, draw a graph to show how the amount of **Z**(aq) changed from the time of initial mixing until 60 seconds had elapsed.



(3)

(c) The student prepared another equilibrium mixture in which the equilibrium concentrations of **X** and **Z** were:
X(aq) = 0.40 mol dm^{-3} and **Z**(aq) = 0.35 mol dm^{-3}.

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For this reaction, the equilibrium constant $K_c = 2.9\ mol^{-2}\ dm^6$.
Calculate a value for the concentration of **Y** at equilibrium.
Give your answer to the appropriate number of significant figures.

[**Y**] = _____ mol dm^{-3}

(3)

(d) The student added a few drops of **Y**(aq) to the equilibrium mixture of **X**(aq), **Y**(aq) and **Z**(aq) in part (c).

Suggest how the colour of the mixture changed. Give a reason for your answer.

Colour change_____

Reason _____

_____

_____

_____

(3)

(e) The student warmed the equilibrium mixture from part (c).

Predict the colour change, if any, when the equilibrium mixture was warmed.

_____

_____

(1)

(Total 12 marks)

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