Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1_Equilibrium Constant Kp For Homogeneous Systems

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Name of the Student:_____
Max. Marks : 11 Marks **Time : 11 Minutes**

Q1.

Hydrogen and carbon monoxide were mixed in a 2:1 mole ratio. The mixture was allowed to reach equilibrium according to the following equation at a fixed temperature and a total pressure of 1.75×10^4 kPa.

$$2H_2(g) + CO(g) \rightleftharpoons CH_3OH(g)$$

(a) The equilibrium mixture contained 0.430 mol of carbon monoxide and 0.0850 mol of methanol.

(i) Calculate the number of moles of hydrogen present in the equilibrium mixture.

_____

(ii) Hence calculate the mole fraction of hydrogen in the equilibrium mixture.

_____

_____

_____

(iii) Calculate the partial pressure of hydrogen in the equilibrium mixture.

_____

_____

_____

(5)

(b) In a different mixture of the three gases at equilibrium, the partial pressure of carbon monoxide was 7550 kPa, the partial pressure of hydrogen was 12300 kPa and the partial pressure of methanol was 2710 kPa.

(i) Write an expression for the equilibrium constant, K_p, for this reaction.

_____

(ii) Calculate the value of the equilibrium constant, K_p, for the reaction under these conditions and state its units.

K_p _____

_____

Units _____

(3)

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(c) Two isomeric esters **E** and **F** formed from methanol have the molecular formula $C_6H_{12}O_2$

Isomer **E** has only 2 singlet peaks in its proton n.m.r. spectrum.

Isomer **F** is optically active.

Draw the structures of these two isomers.

*Isomer **E***

*Isomer **F***

(2)
(Total 10 marks)

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Q2.

Summarised directions for recording responses to multiple completion questions			
A (i), (ii) and (iii) only	**B** (i) and (iii) only	**C** (ii) and (iv) only	**D** (iv) alone

Which of the following statements about a catalyst is / are true?

(i) It speeds up the forward reaction and slows down the reversere action.

(iii) It increases the proportion of molecules with higher energies.

(iii) A homogeneous catalyst usually acts in the solid state.

(iv) It does not alter the value of the equilibrium constant.

(Total 1 mark)

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