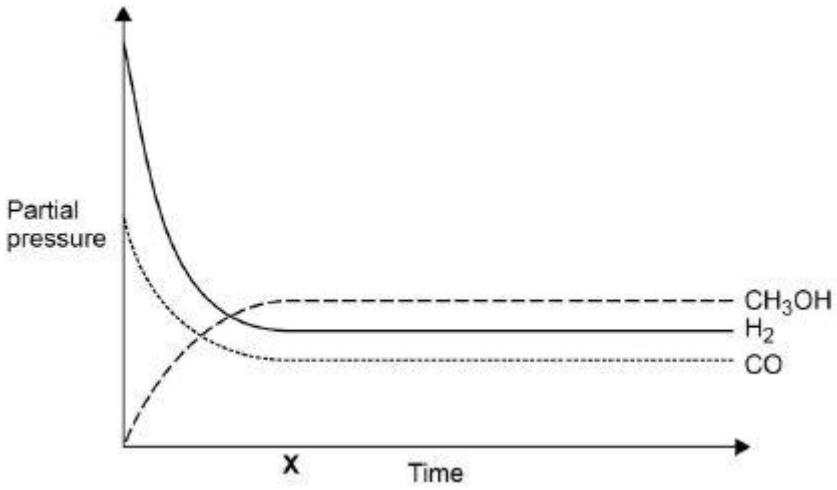
Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

(a)



X must be on or just below line of x axis

1

(b) **M1** Equilibrium n(H_2) = 0.24

1

M2 Total number of moles = 0.47

1

M3 Mole fraction of H_2 = 0.51(1) or $\frac{0.24}{0.47}$

M3 *Allow mole fraction of* H_2 = $\frac{M1}{M2}$

1

M4 Partial pressure of hydrogen = 5310 or 5.31 x 10^3 kPa

M4 *Allow Partial pressure of hydrogen =* ***M3*** *x 1.04 × 10^4*

1

(c) **M1** $K_p = \frac{ppCH_3OH}{ppH_2^2 \times ppCO}$ OR $\frac{pCH_3OH}{pH_2^2 \times pCO}$

Do not allow square brackets

1

Pa^{-2} or kPa^{-2}

Allow any pressure to power of $^{-2}$

1

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(d) **M1** Increases

1

M2 No effect

1

(e) **M1** No effect

1

M2 Increases <u>rate</u> of forward and backward reaction equally/by the same amount OR catalyst does not affect position of equilibrium

M2 *Allow Catalyst does not appear in the K_p expression*

M2 *Allow Only temperature affects Kp*

Ignore Catalysts increase the rate of reaction or rate at which equilibrium is reached 1

1

[11]

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Q2.

C

The rate of the reverse reaction increases.

[1]

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Q3.

(a) Amount Diester = 1 - $\frac{x}{2}$

M1

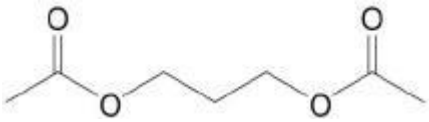
Amount Water = 1- x

M2

Amount Diol = $\frac{x}{2}$

M3

(b)



Allow other versions of the structure (abbreviated or displayed)

1

(c) $K_c = \frac{0.452^2 \times 0.273}{0.971 \times (\text{amount } H_2O)^2}$ or $\frac{[\text{acid}]^2 \times [\text{diol}]}{[\text{diester}] \times [H_2O]^2}$

$(\text{Amount } H_2O)^2 = \frac{0.452^2 \times 0.273}{0.161 \times 0.971}$ or $\frac{[\text{acid}]^2 \times [\text{diol}]}{[\text{diester}] \times K_c} = (0.357)$

M1

$$K_c = \frac{\left(\frac{0.452}{v}\right)^2 \times \left(\frac{0.273}{v}\right)}{\left(\frac{0.971}{v}\right)\left(\frac{amount\ H2O}{v}\right)^2}$$

M2

Amount $H_2O = \sqrt{0.357} = 0.597$ mol

M3

[7]

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