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

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 27 Marks **Time : 27 Minutes**

Mark Schemes

Q1.

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

M1

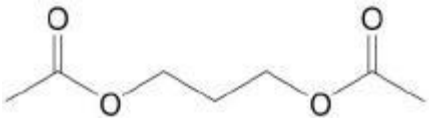
Amount Water = 1- x

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

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

M2

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

M3

[7]

Downloaded from www.merit-minds.com

Q2.

(a) **M1** $\frac{[CO]^2\,[H_2]^4}{[C_2H_5OH]\,[H_2O]}$

1

M2 $mol^4\ dm^{-12}$

M2** allow for units that are consequential on **M1

1

(b) **M1** clear attempt made to divide moles by volume to find concentrations

*7.66×10^{-3} scores **M1,2,3***

*7.66×10^{-15} scores **M1,3***

***M1** can use 0.750 or 750 (or 75, 7.5, 0.075, 0.0075, etc)*

1

M2 $\frac{\left[\frac{0.110}{0.750}\right]^2\left[\frac{0.220}{0.750}\right]^4}{\left[\frac{0.075}{0.750}\right]\left[\frac{0.156}{0.750}\right]}$

M2 $\frac{(0.147)^2\,(0.293)^4}{(0.100)\,(0.208)}$ or $\frac{(0.0215)\,(0.00740)}{(0.100)\,(0.208)}$

*for **M2** volume used must be 0.750 or 750 (if use V at this stage, then must be one of these values of V used later on)*

1

M3 7.66×10^{-3}

***M3** ignore units*

If moles are used in place of concentration

*penalise **M1**, but **M2** and **M3** could score for ECF*

M2 $\frac{(0.110)^2\,(0.220)^4}{(0.075)\,(0.156)}$ *M3 2.42×10^{-3}*

Allow ECF if incorrect expression for K_c is used

1

(c) **M1** yield would decrease

mark each point independently

1

M2 equilibrium (position) moves left / shifts left / in direction of reverse reaction

to oppose increase in pressure / to reduce pressure

***M2** need both parts; ignore favours reverse reaction for the first part*

1

M3 fewer moles/molecules of gas on left hand side / fewer moles/molecules of gaseous reactants

***M3** 2 moles/molecules (of gas) on left hand side v 6 moles/molecules (of gas) on right hand side*

1

M4 no effect on K_c

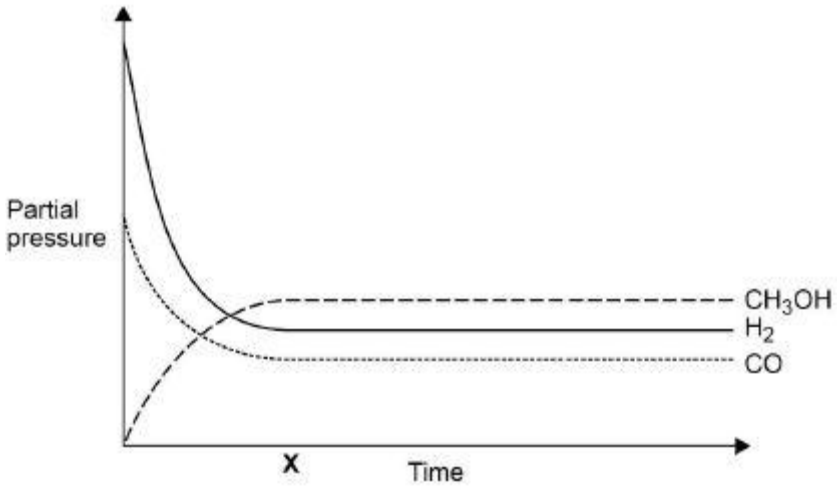
1

[9]

Downloaded from www.merit-minds.com

Q3.

(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

(d) **M1** Increases

1

M2 No effect

1

(e) **M1** No effect

1

M2 Increases rate 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*

Downloaded from www.merit-minds.com

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

1

[11]

Downloaded from www.merit-minds.com