Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Mark Schemes

Q1.

(a) Initial amount of A = 6.4×10^{-3}

If M1 wrong can score max 3

M1

Equ A = $6.4 \times 10^{-3} - 2x \therefore x = 1.25 \times 10^{-3}$

If incorrect x can score max 3

M2

B = $9.5 \times 10^{-3} - x = 8.25 \times 10^{-3}$

Allow 2 or more sig figs

M3

C = $2.8 \times 10^{-2} + 3x = 0.0318$

M4

D = $x = 1.25 \times 10^{-3}$

M5

(b) $K_c = \frac{[C]^3[D]}{[A]^2[B]}$

Penalise ( ) but mark on in (b) & (c)

1

Units = mol dm^{-3}

If K_c wrong no mark for units

1

(c) M1 for correct rearrangement $[A]^2 = \frac{[C]^3[D]}{K_c[B]}$ or $[A] = \sqrt{\frac{[C]^3[D]}{K_c[B]}}$

If K_c wrong in (b) can score 1 for dividing by correct volume

M1

M2 for division of mol of B, C and D by correct volume

If K_c correct but incorrect rearrangement can score 1 for dividing by correct volume

M2

$$[A]^2 = \frac{[1.05/0.5]^3[0.076/0.5]}{116 \times [0.21/0.5]}$$

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M3 for final answer: [A] = <u>0.17</u> (must be 2 sfs)

M3

(d) (All) conc fall: (ignore dilution)

OR K_c = mole ratio × 1/V

1

Equm moves to side with more moles

If vol increases, mole ratio must increase

1

To oppose the decrease in conc

To keep K_c constant

If only conc of A falls CE=0

If pressure falls CE=0

1

[13]

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Q2.

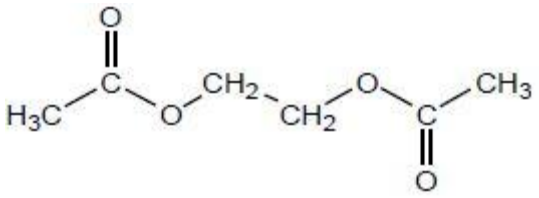
C

[1]

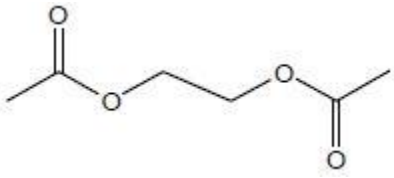
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Q3.

(a)



Allow $CH_3COOCH_2CH_2OOCCH_3$
OR $CH_3COOCH_2CH_2OCOCH_3$
OR



1

(b) Mol $HOCH_2CH_2OH$ = 6.00×10^{-2} OR 0.06(00)

1

Mol $C_6H_{10}O_4$ = 1.45×10^{-1} OR 0.145

1

Mol H_2O = 2.90×10^{-1} OR 0.29(0)

1

(c)

$$(K_c =) \frac{[\text{ester}] \times [H_2O]^2}{[CH_3COOH]^2 \times [HOCH_2CH_2OH]}$$

Allow words for acid and alcohol

1

The volume cancels out (Penalise a contradictory justification from expression if the volumes do not cancel out)
OR
there are <u>equal no of moles on each side of the equation</u>
<u>OR</u>
there are <u>equal no of molecules on each side of the equation</u>

1

(d)

$$(\text{Mol } CH_3COOH / V)^2 = \frac{(8.02 \times 10^{-1}/V)(1.15/V)^2}{6.45 \times (2.64 \times 10^{-1}/V)}$$

M1

$$\text{Mol } CH_3COOH = \sqrt{\frac{(8.02 \times 10^{-1}) \times (1.15)^2}{6.45 \times (2.64 \times 10^{-1})}} = \sqrt{0.623}$$

M2

Mol CH_3COOH = 0.789 <u>(must be 3 sfs)</u> Allow 0.788 – 0.790

M3

0.789 scores 3

Allow without V : $(nCH_3COOH)^2 = \frac{(8.02 \times 10^{-1})(1.15)^2}{6.45 \times (2.64 \times 10^{-1})}$

If $(nCH_3COOH)^2$ =0.623 then award M1 and M2

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If K_c is correct in (c) but incorrect rearrangement, then CE=0 except if upside down rearrangement then M3 only awarded for 1.27

If K_c is incorrect in (c) then only M1 can be awarded for correct rearrangement.

[9]

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