

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

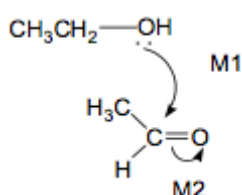
Mark Schemes

Q1.

- (a) (i)
- Nucleophilic addition

*Any extra loses the mark**Allow minor spelling errors e.g. nucleophyllic*

1



(ii)

*M1 for arrow from lone pair on oxygen in ethanol to C of C=O (or to space half way between O and C)**M2 for arrow from C=O bond to oxygen in ethanal**Do not allow M2 as first step without nucleophilic attack, but can allow M1 for attack on C+ produced**+ rather than $\delta+$ on C=O loses M2**Ignore any further steps**Mark independently*

1

1

- (b) (i)
- Equal
- mixture of enantiomers/optical isomers OWTTE

1

- (ii) (Non-superimposable) mirror images

*Ignore rotates light in opposite directions**Ignore stereoisomers*

1

- (c) (i) Ethanol 0.33

1

Ethanol 4.16

Allow 4.2 for ethanol

1

$$K_c = \frac{[acetal][H_2O]}{[CH_3CHO][CH_3CH_2OH]^2} \text{ or with names}$$

$$(ii) \quad \frac{(0.37/0.31)(0.65/0.31)}{(0.58/0.31)(3.76/0.31)^2} \quad \text{OR} \quad \frac{(0.37)(0.65)}{(0.58)(3.76)^2} \times 0.31$$

Ignore slips in acetal structure or formula $C_6H_{14}O_2$

If K_c wrong, allow M4 only for units consequent to their K_c

If volume omitted (gives 2.93×10^{-2}) may only score M1 and M4

If volume used = 310 cm^3 allow M2 then award M3 for $9.08 - 9.23$ only and M4 for $\text{mol}^{-1} \text{ cm}^3$ only

Treat error in converting 310 cm^3 to dm^3 as AE

M1

M2

$$9.1 \times 10^{-3}$$

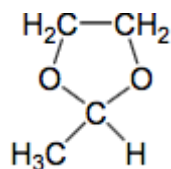
Allow range $9.08 \times 10^{-3} - 9.23 \times 10^{-3}$

M3

$$\text{mol}^{-1} \text{dm}^3$$

Not $\text{moles}^{-1} \text{dm}^3$

M4

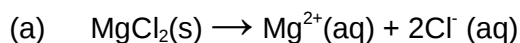


(d)

1

[12]

Q2.



State symbols essential

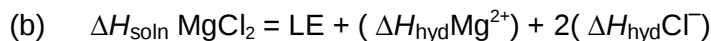
Do not allow this equation with H_2O on the LHS

Ignore + aq on the LHS

Allow H_2O written over the arrow / allow equation written as an equilibrium

Allow correct equations to form $[\text{Mg}(\text{H}_2\text{O})_6]^{2+}$ ions

1



$$\Delta H_{\text{soln}} \text{MgCl}_2 = 2493 - 1920 + (2 \times -364)$$

$$= -155 \text{ (kJ mol}^{-1}\text{)}$$

M1 for expression in words or with correct numbers

Ignore units, but penalise incorrect units

1

1

(c) M1: Solubility decreases (as temp increases)

M2: the enthalpy of solution is exothermic / reaction is exothermic / backwards reaction is endothermic

M3: (According to Le Chatelier) the equilibrium moves to absorb heat/reduce temperature/oppose the increase in temperature (in the endothermic direction)

If M1 is incorrect then CE=0/3

If answer to (b) is a +ve value, allow:

M1: Solubility increases (as temp increases)

M2: Enthalpy of solution is endothermic etc

M3: (According to Le Chatelier) the equilibrium moves to absorb heat/reduce the temperature/oppose the increase in temperature (in the endothermic direction)

1

1

1

[6]