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

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Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Mark Schemes

Q1.

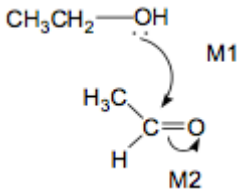
(a) (i) Nucleophilic addition

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 δ+ 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) Ethan**al** 0.33

1

Ethan**ol** 4.16

Allow 4.2 for ethanol

1

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

(ii) $\dfrac{(0.37/0.31)(0.65/0.31)}{(0.58/0.31)(3.76/0.31)^2}$ **OR** $\dfrac{(0.37)(0.65)}{(0.58)(3.76)^2} \times 0.31$

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

If K_c wrong, allow M4 only for units conseq 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 mol^{-1} cm^3 only

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

M1
M2

9.1×10^{-3}

Allow range 9.08×10^{-3} – 9.23×10^{-3}

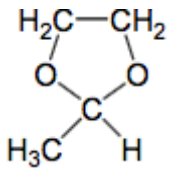
M3

$mol^{-1}dm^3$

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

M4

(d)



1

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Q2.

(a) $MgCl_2(s) \longrightarrow Mg^{2+}(aq) + 2Cl^-(aq)$

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 $[Mg(H_2O)_6]^{2+}$ ions

1

(b) $\Delta H_{soln}\ MgCl_2 = LE + (\Delta H_{hyd}Mg^{2+}) + 2(\Delta H_{hyd}Cl^-)$

$\Delta H_{soln}\ MgCl_2 = 2493 - 1920 + (2 \times -364)$

$= -155$ (kJ mol-1)

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]

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