Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Carboxylic Acids & Derivatives

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Name of the Student:_____
Max. Marks : 29 Marks **Time : 29 Minutes**

Mark Schemes

Q1.

(a) *M1* $K_p = (_PY)^3 . (_PZ)^2 / (_PW)^2 . (_PX)$ *NB [ ] wrong* **1**

M2 temperature **1**

M3 increase **1**

M4 particles have more energy or greater velocity/speed **1**

M5 more collisions with $E > E_a$ or more successful collisions **1**

M6 Reaction exothermic or converse **1**

M7 Equilibrium moves in the left **1**

Marks for other answers

Increase in pressure or concentration	*allow M1, M5, M6*	*Max 3*
Addition of a catalyst;	*allow M1, M5, M6*	*Max 3*
Decrease in temperature;	*allow M1, M2, M6*	*Max 3*
Two or more changes made;	*allow M1, M6*	*Max 2*

(b) (i) Advantage; reaction goes to completion, not reversible or faster **1**

Disadvantage; reaction vigorous/dangerous
(exothermic must be qualified)

or HCl(g) evolved/toxic
or CH_3COCl expensive

NB Allow converse answers
Do not allow reactions with other reagents e.g. water or ease of separation **1**

(ii) $\Delta S = \Sigma S$ products $- \Sigma S$ reactants **1**

$\Delta S = (259 + 187) - (201 + 161)$ **1**

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$\Delta S = 84$ (JK^{-1} mol^{-1}) *(Ignore units)*

*Allow – 84 to score **(1)** mark*

1

$\Delta G = \Delta H - T\Delta S$

1

$= -21.6 - 298 \times 84/1000$

$= -46.6$ kJ mol^{-1} or $-46\,600$ J mol^{-1}

1

*Allow **(2)** for – 46.6 without units*

(Mark ΔG consequentially to incorrect ⊿S)

(e.g. ⊿S = –84 gives ⊿G = +3.4 kJ mol^{-1})

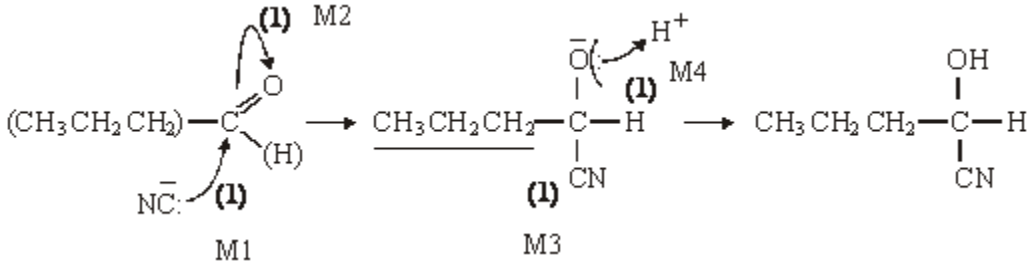
1

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Q2.

(a) *Mechanism*



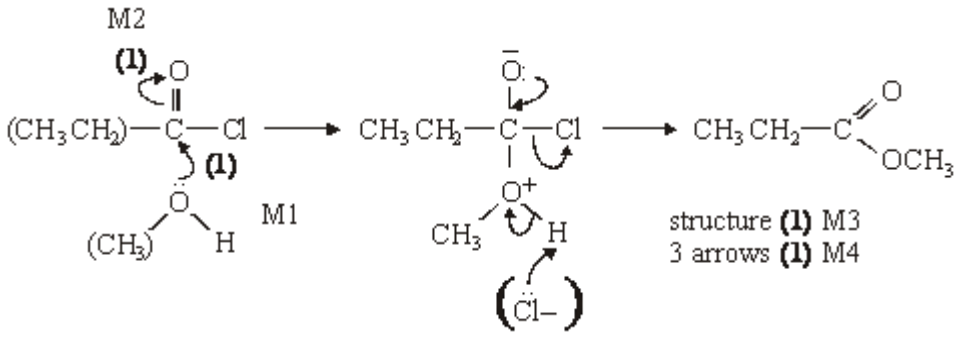
Allow C_3H_7 if structure shown elsewhere
penalise HCN splitting if wrong

Name of product: 2-hydroxypenta(neo)nitrile **(1)**

or 1-cyanobutan-1-ol

5

(b) *Mechanism*

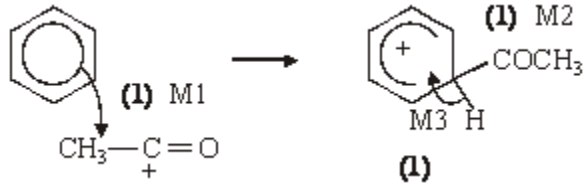


Name of organic product: methylpropanoate **(1)**

5

(c) (i) ([] CH_3CO [])$^+$ **(1)**

(ii)



4

Notes

(abc) extra curly arrows are penalised

(a) be lenient on position of negative sign on : CN^- but arrow must come from lp

(a)/(b) C=O alone loses M2 but can score M1 for attack on C+, similarly C—Cl

(a) allow 2-hydroxypentanonitrile or 2-hydroxypenta(ne)nitrile ... pentylnitrile

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(b) in M4, allow extra: Cl^- attack on H, showing loss of H^+

(c) (i) allow formula in an "equation"(balanced or not)
be lenient on the position of the + on the formula

(ii) for M1 the arrow must go to the C or the + on the C
don't be too harsh about the horseshoe, but + must not be close to the saturated C
M3 must be final step not earlier; allow M3 even if structure (M2) is wrong

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