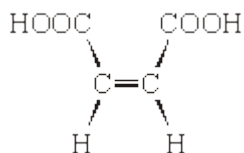


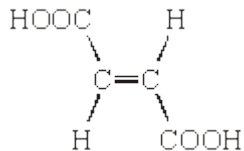
Mark schemes

1

(a)



1



1

NB The bonds shown in the structure must be correct

Isomerism: E-Z isomerism

*If written answer is correct, ignore incorrect labelling of structures.
If no written answer, allow correctly labelled structures.*

1

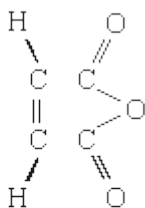
Both COOH groups must be on the same side/ close together/ cis

1

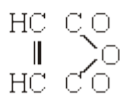
No rotation about C=C axis

1

Structure



Allow



1

2

- (a) M1 $K_p = (p_Y)^3 \cdot (p_Z)^2 / (p_W)^2 \cdot (p_X)$ 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

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

- (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 CH₃COCl expensive

NB Allow converse answers

Do not allow reactions with other reagents e.g. water or ease of separation

1

(ii) $\Delta S = \Sigma S \text{ products} - \Sigma S \text{ reactants}$ 1

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

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

Allow - 84 to score (1) mark

 1

$$\Delta G = \Delta H - T\Delta S$$
 1

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

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

Allow (2) for - 46.6 without units

(Mark ΔG consequentially to incorrect ΔS)

(e.g. $\Delta S = -84$ gives $\Delta G = +3.4 \text{ kJ mol}^{-1}$)

 1

[15]

3

[1]

4

[1]

5

(a) (i) propyl methanoate (1)

not propanyl

- *A wrong reagent or no reagent scores zero*
- *An incomplete reagent such as silver nitrate for Tollens, or potassium dichromate loses the reagent mark, but can get both observation marks*
- *penalise observations which just say colour change occurs or only state starting colour*

- (ii) *Reagent: NaHCO₃ (1)*
Observation with C: no reaction (1)
Observation with D: effervescence (1)
 for **C** and **D** NOT Tollens

Test	an identified (hydrogen) carbonate	acidified K ₂ Cr ₂ O ₇	acidified KMnO ₄	correct metal	UI or stated indicator	PCl ₅
Observation with C	no reaction	goes green	goes colourless	no reaction	no change	no reaction
observation with D	bubbles or CO ₂	no change	no change	bubbles or H ₂	red or correct colour pH 3 – 6.9	(misty) fumes

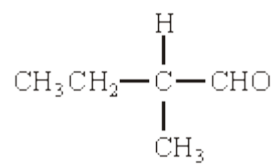
4

- (b) (i) *Reagent: pentan-2-one (1)*
or 2-pentanone
but not pent-2-one or pentyl
- (ii) *Reagent: Tollen's or Fehling's (1)*
Observation with E: no reaction (1)
Observation with F: silver mirror or red ppt (1)
 for **E** and **F**

Test	Tollens	Fehlings or Benedicts	iodoform or I ₂ /NaOH	acidified K ₂ Cr ₂ O ₇	Schiff's
observation with E	no reaction	no reaction	yellow (ppt)	no change	no reaction
observation with F	silver or mirror or grey or ppt	red or ppt not red solution	no reaction	goes green	goes pink

4

(c) **(1)**



must be aldehyde. Allow C₂H₅ for CH₃CH₂ otherwise this is the only answer

1

[9]

6

[1]

7

[1]