

Name of the Student: _____

Max. Marks : 26 Marks

Time : 26 Minutes

Mark Schemes

Q1.

- (a) to neutralise stomach acidity

OR

as an antacid

OR

eases indigestion/heartburn

Ignore milk of magnesia

Credit suitable reference to indigestion/laxative/relief of constipation

1

- (b) (i) an electron acceptor

OR

(readily) gains/accepts/receives electron(s)

NOT an electron pair acceptor

Ignore removes/takes away/attracts electrons

1

- (ii) Br₂ ONLY

Ignore "bromine"

Apply the list principle

1

- (iii) $\text{H}_2\text{SO}_4 + 2\text{H}^+ + 2\text{e}^- \longrightarrow \text{SO}_2 + 2\text{H}_2\text{O}$

OR



Ignore state symbols

Ignore absence of negative charge on electron

Or multiples of equations

1

- (c) (i) (acid) catalyst

OR

catalyses (the reaction)

OR

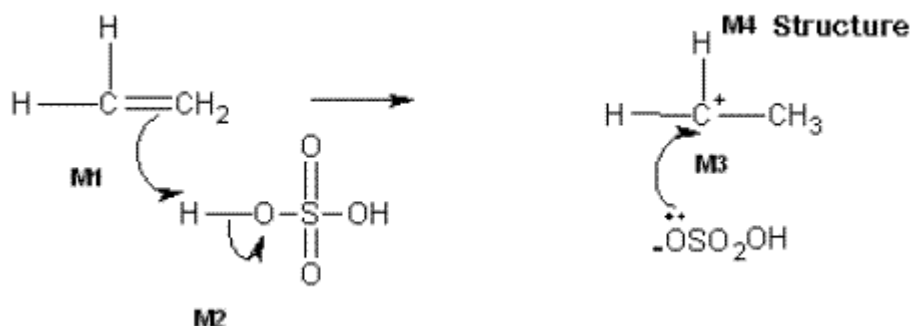
to speed up the reaction/increase the rate (of reaction)

Ignore "provides H^+ ions"

Accept phonetic spelling

1

(ii)



M1 must show an arrow from the double bond towards the H atom of the H – O bond OR HO on a compound with molecular formula for H_2SO_4 (or accept H_2SO_3 here)

M1 could be to an H^+ ion and M2 an independent O – H bond break on a compound with molecular formula for H_2SO_4 or H_2SO_3

M2 must show the breaking of the O – H bond.

M3 must show an arrow from the lone pair of electrons on the correct oxygen of the negatively charged ion towards the positively charged carbon atom.

M4 is for the structure of the carbocation.

NB The arrows here are double-headed

M2 Ignore partial charges unless wrong

M3 NOT HSO_4^-

For M3, credit as shown or $^-OSO_3H$ ONLY with the negative charge anywhere on this ion

OR correctly drawn out with the negative charge placed correctly on oxygen

Max 3 marks for wrong reactant

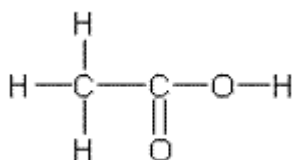
Do not penalise the use of "sticks"

4

(iii) Primary **OR** 1° (alcohol)

1

(iv) Displayed formula for ethanoic acid, CH_3COOH



All the bonds must be drawn out and this includes the O – H bond
Ignore bond angles.

1

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Q2.

(a) **Three conditions in any order for M1 to M3**

M1 yeast or zymase

M2 $30\text{ }^{\circ}\text{C} \geq T \leq 42\text{ }^{\circ}\text{C}$

M3 anaerobic/no oxygen/no air OR neutral pH

M4 $\text{C}_6\text{H}_{12}\text{O}_6 \longrightarrow \text{2C}_2\text{H}_5\text{OH} + \text{2CO}_2$

OR

$\text{2C}_6\text{H}_{12}\text{O}_6 \longrightarrow \text{4C}_2\text{H}_5\text{OH} + \text{4CO}_2$

Mark independently

Penalise "bacteria" and "phosphoric acid" using the list principle

Ignore reference to "aqueous" or "water" (i.e. not part of the list principle)

Or other multiples

4

(b) **M1** Carbon-neutral

Ignore "biofuel"

1

M2 6 (mol/molecules) CO₂/carbon dioxide taken in/used/used up (to form glucose or in photosynthesis)

1

M3 6 (mol/molecules) CO₂/carbon dioxide given out due to
2 (mol/molecules) CO₂/carbon dioxide from fermentation/
Process 2 and 4 (mol/molecules) CO₂/carbon dioxide from
combustion/Process 3

It is NOT sufficient in M2 and M3 for equations alone without commentary or annotation or calculation

1

(c) **M1 (could be scored by a correct mathematical expression)**

(Sum of) bonds broken – (Sum of) bonds made/formed = ΔH

OR

$(\Sigma) \underline{B_{\text{reactants}}} - (\Sigma) \underline{B_{\text{products}}} = \Delta H$

(where B = bond enthalpy/bond energy)

For M1 there must be a correct mathematical expression using ΔH or "enthalpy change"

M2 Reactants = (+) 4719

OR

Products = (–) 5750

M3 Overall + 4719 – 5750 = –1031 (kJ mol^{–1}) **(This is worth 3 marks)**

Award full marks for correct answer.

Ignore units.

M2 is for either value underlined

M3 is NOT consequential on M2

3

Award 1 mark ONLY for +1031

Candidates may use a cycle and gain full marks.

- M4 Mean bond enthalpies are not specific for this reaction
OR they are average values from many different
compounds/molecules

Do not forget to award this mark

1

- (d) **M1** $q = m c \Delta T$ (this mark for correct mathematical formula)

- M2** = 6688 (J) OR 6.688 (kJ) OR 6.69 (kJ) OR 6.7 (kJ)

- M3** 0.46g is 0.01 mol
therefore $\Delta H = -669 \text{ kJ mol}^{-1}$ OR -670 kJmol^{-1}
OR **-668.8** kJ mol^{-1}

Award M1, M2 and M3 for correct answer to the calculation

Penalise M3 ONLY if correct answer but sign is incorrect

In M1, do not penalise incorrect cases in the formula

If $m = 0.46$ or $m = 200.46$ OR if $\Delta T = 281$, CE and penalise M2 and M3

*If $c = 4.81$ (leads to 7696) penalise M2 ONLY and mark on for M3 =
-769.6 OR -770*

Ignore incorrect units in M2

- M4** Incomplete combustion

Do not forget to award this mark. Mark independently

4

[15]