

Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Mark Schemes

Q1.

(a)

This question is marked using levels of response. Refer to the Mark Scheme Instructions for Examiners for guidance on how to mark this question.	
Level 3 5-6 marks	All stages are covered and each stage is generally correct and virtually complete (6 v 5) Answer is well structured, with no repetition or irrelevant points, and covers all aspects of the question. Accurate and clear expression of ideas with no errors in use of technical terms.
Level 2 3-4 marks	All stages are covered but stage(s) may be incomplete or may contain inaccuracies OR two stages are covered and are generally correct and virtually complete (4 v 3) Answer has some structure and covers most aspects of the question. Ideas are expressed with reasonable clarity with, perhaps, some repetition or some irrelevant points. If any, only minor errors in use of technical terms.
Level 1 1-2 marks	Two stages are covered but stage(s) may be incomplete or may contain inaccuracies OR only one stage is covered but is generally correct and virtually complete (2 v 1) Answer includes statements which are presented in a logical order and/or linked.
Level 0	Insufficient correct chemistry to gain a mark.

Stage 1

Anti-bumping granules

1a no anti-bumping granules / add anti-bumping granules

1b to create smaller bubbles / to prevent large bubbles / to prevent mixture jumping into condenser

Stage 2

Open system with no thermometer

2a system should be closed (above flask) to prevent gases escaping

2b should be closed with (bung +) thermometer

2c to allow collection of propanone (only) / to prevent distillation of other components / to stay in suitable temperature range

Stage 3

The water direction in the condenser

3a water flows in wrong direction through condenser / change water direction

3b condenser not cool enough / not full of water

3c product may not condense / comes through as gas

6

(b) **M1** mass of propan-2-ol = 2.0×0.786 (= 1.572 g to at least 2sf)**M2** amount of propan-2-ol = $\frac{1.572}{60.0}$ (= 0.0262 to at least 2 sf) mol**M3** mass of propanone expected = 0.0262×58.0 (= 1.52 g to at least 2sf)**M4** % yield = $\left(\frac{0.954}{1.52} \times 100\right)$ = 63% (2sf only)**Alternative for M3/4****M3** amount of propanone formed = $\frac{0.954}{58.0}$ (= 0.0164) mol**M4** % yield = $\left(\frac{0.0164}{0.0262} \times 100\right)$ = 63% (2sf only)

Allow ECF at each step

4

(c) **M1** propan-2-ol: tetrahedral and 109.5° **M1** allow $104-110^\circ$

1

M2 propanone: trigonal planar and 120° **M2** allow $115-123^\circ$

Any two correct boxes scores one mark

1

(d) **M1** propan-2-ol has stronger intermolecular forcesPenalise **M1** and **M2** for any reference to breaking covalent bonds, (but **M3** could score)

1

M2 propan-2-ol has hydrogen bonds between moleculesFor **M2** ignore reference to dipole-dipole forces in propan-2-ol

1

M3 propanone has dipole-dipole forces and/or van der Waals' forces

1

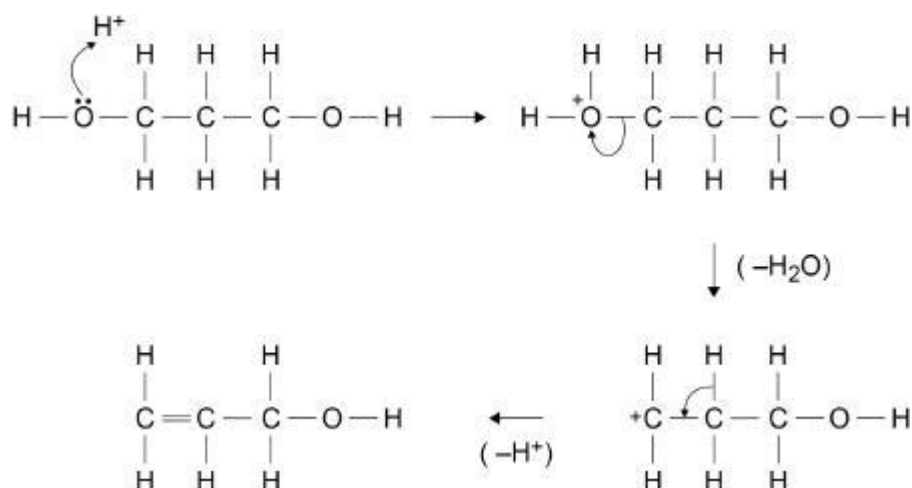
[15]

Q2.

(a) nucleophilic substitution

1

(b) **M1** elimination



1

M2 arrow from lone pair on O to H^+

1

M3 1st intermediate **and** arrow from $C-O^+H_2$ bond to O

1

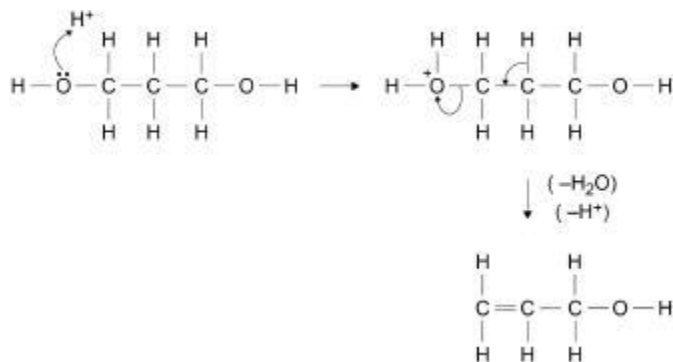
M4 2nd intermediate (carbocation) **and** arrow from a correct $C-H$ bond to correct $C-C$ to form $C=C$

Max 2 of 3 marks (M2-4) for wrong organic reactant (ignore structure of product)

M3 and M4 can be scored in one concurrent step:

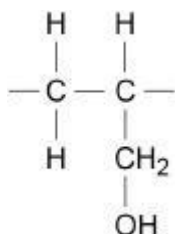
M3 for correct intermediate and arrow from $C-O^+H_2$ bond to O

M4 for arrow from a correct $C-H$ bond to correct $C-C$ to form $C=C$ 1



1

(c)

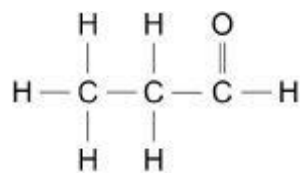


Any correct structural representation

Ignore any brackets and/or n

1

(d)



Structure in any form

1

[7]