Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Alkenes

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Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 28 Marks **Time : 28 Minutes**

Mark Schemes

Q1.

(a) **Step 1**

M1 fractional distillation

1

M2 separated into mixtures of compounds with similar boiling points / similar sized molecules

M2 *to separate naphtha from other compounds; to separate compounds by chain length / size / boiling point*

1

Step 2

M3 (thermal) cracking

M3 *not catalytic cracking*

1

M4 to make alkenes / propene ***/*** shorter molecules

1

Step 3

M5 (addition) polymerisation

M5 *not condensation polymerisation 1*

1

M6 molecules joined together or to produce long chain molecule

For each step the two marks are independent

1

(b) no polar bonds (in chain) / non-polar

Do not allow if only C-H bonds mentioned as non polar

1

(c) to prevent build-up of waste (in landfill) OR they can be broken down by natural processes

1

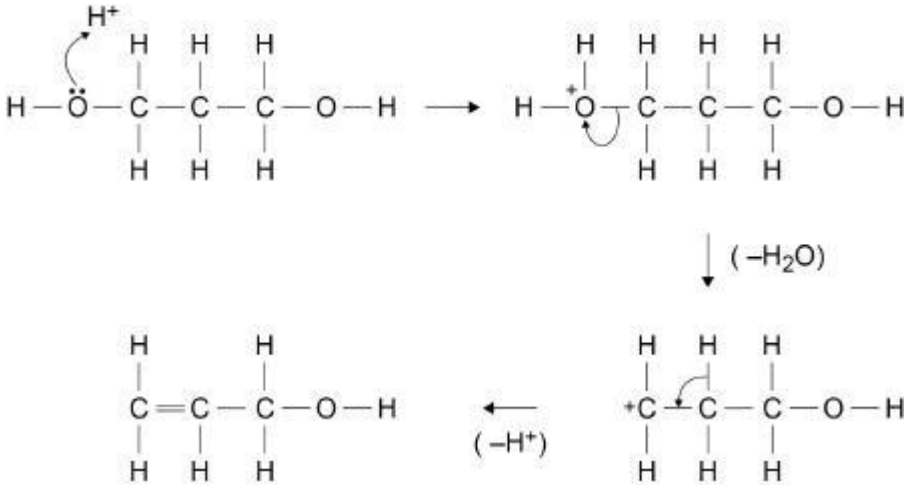
[8]

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

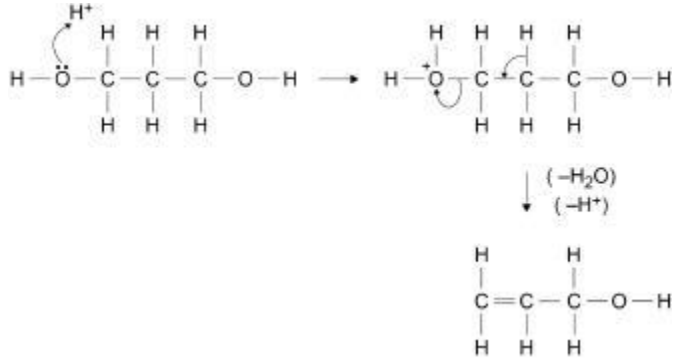
M4 2nd intermediate (carbocation) **and** arrow from a correct C–H bond to correct C–C to form C=C

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:*

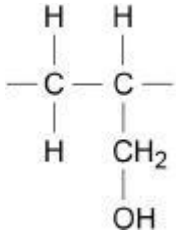
M3 for correct intermediate and arrow from C–O^+H_2 bond to O

M4 *for arrow from a correct C–H bond to correct C–C to form C=C 1*



1

(c)

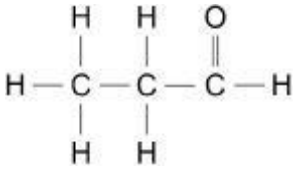


Any correct structural representation

Ignore any brackets and/or n

1

(d)



Structure in any form

1

[7]

Q3.

(a) Dehydration

Allow (acid catalysed) Elimination

M1

Conc H_2SO_4

Allow Conc H_3PO_4

M2

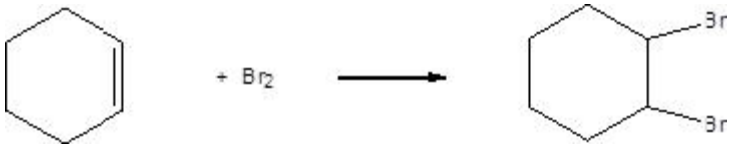
(b) Br_2

Allow bromine (water)

Allow Cl_2 or I_2

Allow O_2 if epoxide route used

M1



allow conseq equation to H_2, H_2O, HBr, HCl. HI and H_2SO_4

An epoxide is a feasible alternative that could score here and consequentially M3 and M4

M2

NaOH

***Or** KOH or other suitable strong alkali*

M3

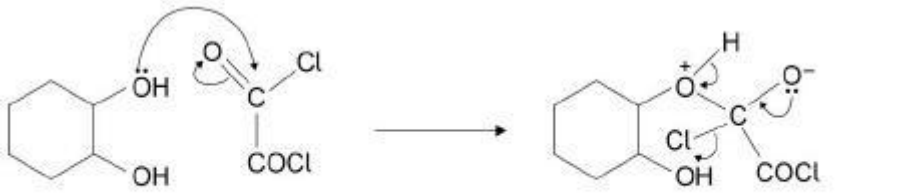
Allow this equation with molecular formulae

M4

(c) **M1** (nucleophilic)addition-elimination

Note lone pair required for M5

M1



M2 curly arrow from lp on O to C
M3 curly arrow from double bond to O
M4 for structure of intermediate
M5 for 3 curly arrows

M2
M3
M4
M5

(d) Less energy used **OR** Better yield

***OR** reduces practical losses, simpler plant,*

M1

Less waste **OR** Less pollution

***OR** maximises the use of raw materials in the process into useful*

products, saves resources

M2

[13]