

Name of the Student: _____

Max. Marks : 27 Marks

Time : 27 Minutes

Mark Schemes

Q1.

(a) **M1** Electrophilic Addition

M2 HBr

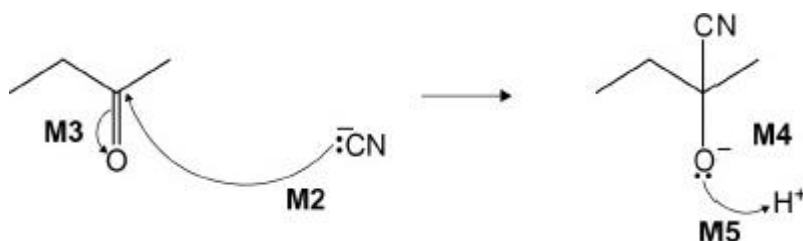
2

(b) **M1** Butan-2-ol or correct structure eg $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$

M2 NaOH AND (warm) aqueous (Allow cold if stated)

2

(c) **M1** HCN or KCN/ H_2SO_4



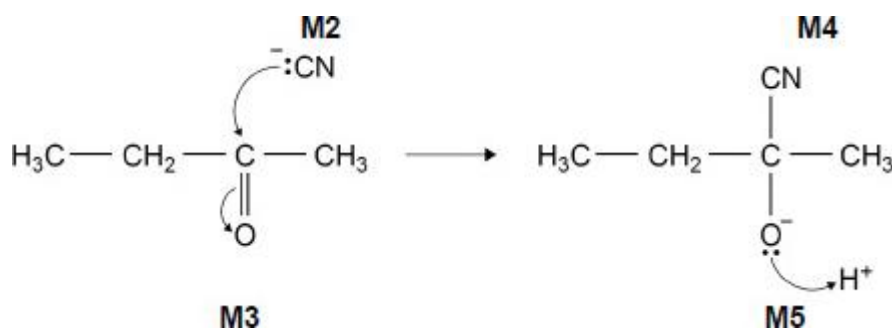
M2 Arrow from lone pair on C to C of $\text{C}=\text{O}$

M3 Arrow from $\text{C}=\text{O}$ to O

M4 Structure of intermediate including negative on O

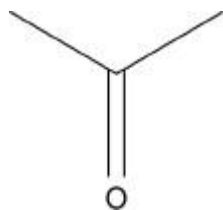
M5 Arrow from lone pair on O to H^+

OR



5

(d)



planar/ flat

Allow planar carbonyl group

M2 Equal chance (50/50) attack from above/below OWTTE

Either side

M3 Giving equal amounts of both optical isomers/enantiomers

3

[12]

Q2.
D

Step 5 H_2 with a nickel catalyst

[1]

Q3.
A

propene

[1]

Q4.

(a) Dehydration

Allow (acid catalysed) Elimination

M1

Conc H_2SO_4

Allow Conc H_3PO_4

M2

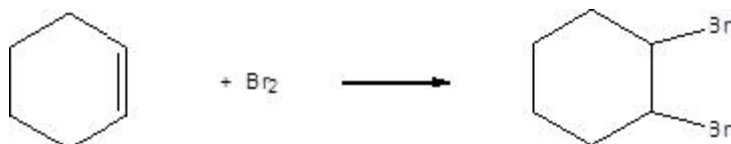
(b) Br_2

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



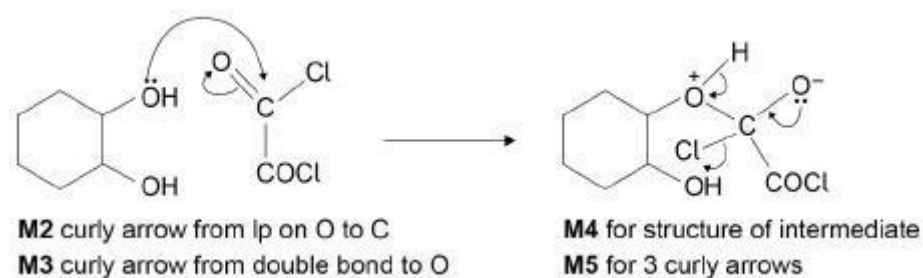
Allow this equation with molecular formulae

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*

