

Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

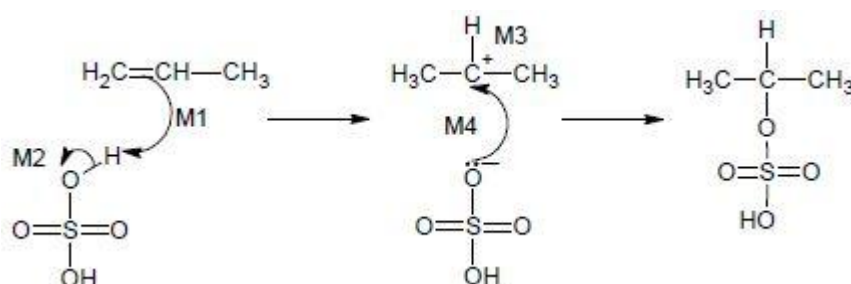
Mark Schemes

Q1.

(a) electrophilic addition*ALLOW phonetic e.g. electrophylic, electrophillic*

1

(b)

**M1:** must show an arrow from = of C=C towards the H atom of the H-O bond or HO that is part of H-O-S-... on a compound with molecular formula H₂SO₄**M1** could have arrow to H⁺ in which case **M2** would be for an independent H-O bond break on a compound with formula H₂SO₄*ALLOW CH₃-C⁺ etc for carbocation**No need for hydrogensulfate to be displayed**If H₂O used as electrophile – max **M3** ONLY***M2:** must use an arrow to show the breaking of the H-O bond***M2** ignore partial charges unless wrong***M3:** is for the correct carbocation structure*NOT **M3** if primary carbocation shown.***M4:** must show an arrow from a lone pair of electrons on the correct oxygen of the negatively charged ion towards the positively charged carbon atom***M4** NOT HSO₄**credit as shown (or ⁻:OSO₂OH)**or as :OSO₃H – in which case negative charge can be shown anywhere**ecf from H₂SO₃ in **M1*****NB: The arrows are double-headed*****IGNORE** subsequent use of water to hydrolyse hydrogensulfate*

4

(c) minor product = CH₃CH₂CH₂OSO₃H*ecf from 1° in (b) for CH₃CH(OSO₃H)CH₃**ecf from alcohol as product in (b)**ecf from side chain such as -OHSO₃ or -HSO₄ in (b)*

1

- (d) (major) product formed via more stable carbocation OR secondary carbocation more stable (than primary)

1

Due to electron-releasing character / (positive) inductive effect of two alkyl / methyl groups (as opposed to one)

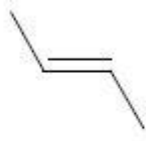
1

ALLOW 'more' alkyl groups in place of 'two' alkyl groups

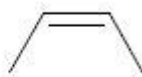
- (e)



but-1-ene



E-but-2-ene



Z-but-2-ene

matching name **and** formula for each mark

One 'salvage' mark available for 3 correct structures or 3 correct names if no other mark awarded

use of trans **and** cis can score 1/2 for the two but-2-ene structures

3

- (f) butanone

ALLOW butan-2-one

1

oxidising agent

ALLOW electron acceptor but NOT electron pair acceptor

1

(fractional) distillation

ALLOW gas chromatography

1

- (g) white / misty / steamy fumes

NOT gas evolved / effervescence

1

acid/proton donor

1

- (h) iodine / I₂

IGNORE state symbols

1

sulfur / S / S₈

If name **and** formula given they must both be right

1

hydrogen sulfide / H₂S

1

[19]