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

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

Mark Schemes

Q1.

(a) **M1** C_nH_{2n+2} **1**

M2 14.0*n* + 2.0 or 14n + 2
or 2(7.0n + 1.0) or 2.0(7n + 1) or 2(7n + 1) **1**

(b) **M1** nonane has stronger / greater / more van der Waals' forces between molecules
or converse arguments for 2,4-dimethylbutane having lower boiling point
question refers to nonane if not expressly stated by candidate
intermolecular forces = forces between molecules
***M1** ignore abbreviations vdW and/or imf* **1**

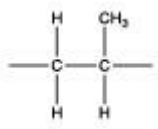
M2 nonane molecules pack closer together / more (surface) contact
***M2** ignore reference to surface area alone*
CE=0 reference to breaking (covalent) bonds / breaking chain **1**

(c) $C_9H_{20} + 14O_2 \rightarrow 9CO_2 + 10H_2O$
allow multiples; ignore any state symbols; correct structures rather than formulae are fine **1**

(d) **M1** nitrogen and oxygen from air react
***M1** must be at least one reference to air and no reference to nitrogen/oxygen coming from the fuel* **1**

M2 at high temperature
ignore reference to pressure, heat, hot, incomplete combustion
if temperature is stated, must be over 1000°C **1**

(e) thermal (cracking) **1**

(f) 

allow any correct structural representation
ignore any n or brackets **1**

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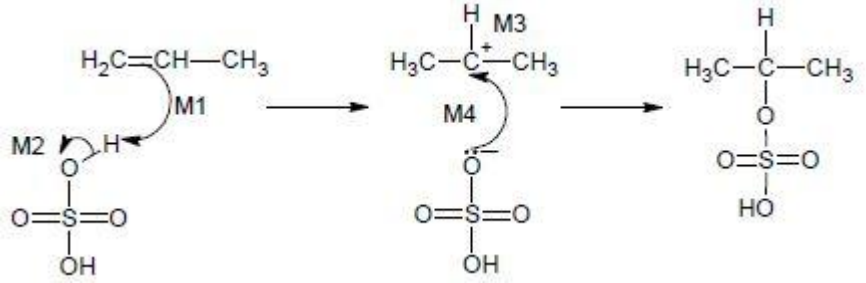
Q2.

(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 H_2SO_4
M1 could have arrow to H^+ in which case **M2** would be for an independent H–O bond break on a compoundwith formula H_2SO_4

ALLOW CH_3–C^+ etc for carbocation

No need for hydrogensulfate to be displayed

*If H_2O 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 HSO_4*

credit as shown (or $^-$:OSO_2OH)

or as :OSO_3H – in which case negative charge can be shown anywhere

*ecf from H_2SO_3 in **M1***

NB: The arrows are double-headed

***IGNORE** subsequent use of water to hydrolyse hydrogensulfate*

4

(c) minor product = $CH_3CH_2CH_2OSO_3H$

ecf from 1° in (b) for $CH_3CH(OSO_3H)CH_3$

ecf from alcohol as product in (b)

ecf from side chain such as –$OHSO_3$ or –HSO_4 in (b)

1

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

1

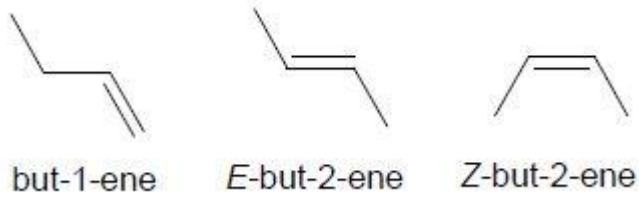
Due to electron-releasing character / (positive) inductive effect of two alkyl / methyl groups (as opposed to one)

1

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

(e)

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*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 / I_2

IGNORE state symbols

1

sulfur / S / S_8

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

1

hydrogen sulfide / H_2S

1

[19]

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