



RECOGNISING ACHIEVEMENT

AS
CHAINS + RINGS
Mark Scheme 2812
January 2005

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1.

- (a) (i) $24.7/12 : 2.1/1 : 73.2/35.5$
 $2.06 : 2.1 : 2.06$

✓

CHCl

✓

- (ii) $(\text{CHCl} = 12 + 1 + 35.5 =) 48.5$

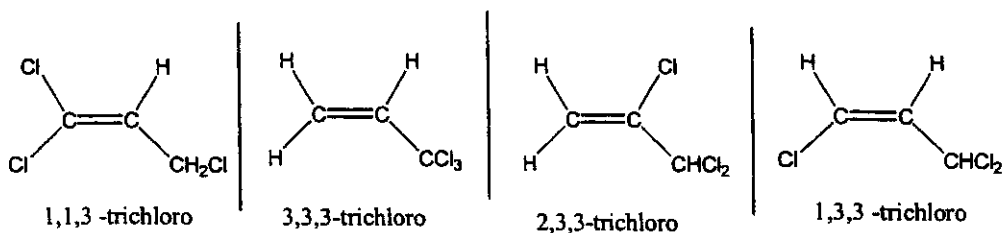
✓

$$48.5 \times 3 = 145.5$$

✓

- (b) (i)

Any two from



✓✓

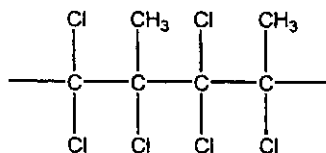
- (ii) 1,2,3-trichloropropene
 (trichloropropene scores 1 mark ✓)

3 marking points:

- correct numbers 1,2,3
 - trichloro
 - propene/prop-1-ene
- any two gets 1 mark

✓✓

- (c) (i)



1 mark if backbone contains 4 carbons with 'end-bonds' and a reasonable attempt has been made e.g used the wrong isomer.... max = 1 mark

✓✓

- (ii) non-biodegradable

✓

toxic fumes evolved when burnt

✓

HCl or Cl• or chlorinated organic compounds such as COCl₂ also evolved when burnt

✓

[Total: 13]

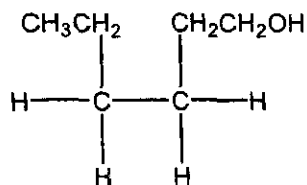
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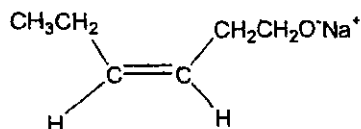
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2.

(a) (i)

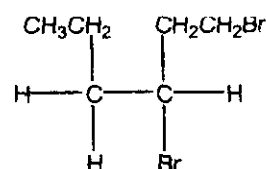


(ii)

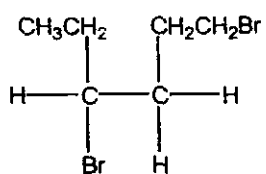


charges are not necessary
allow the alkoxide ion

(iii)

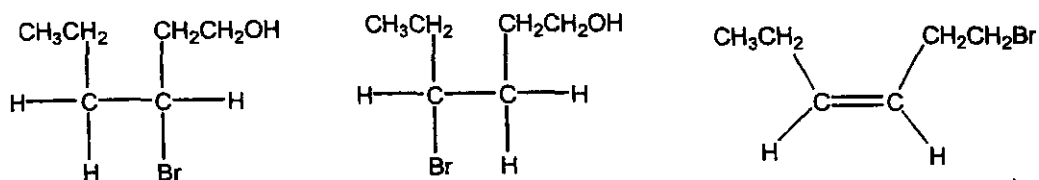


Both correct products gets 3 marks



One correct product gets 2 marks

If neither of the above is correct then one mark can be awarded for any of:



max of two marks

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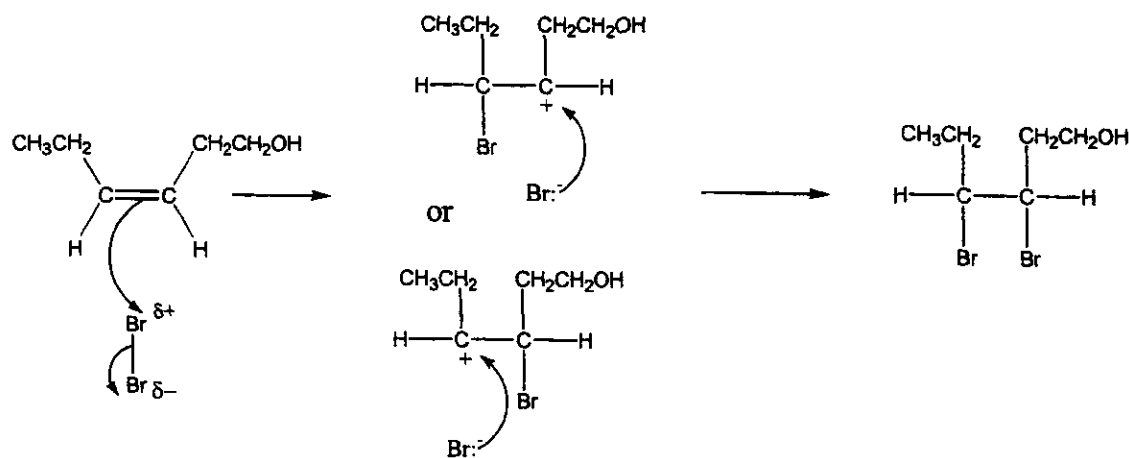
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(b) (i) decolourises

✓

(ii)



curly arrow from C=C bond to bromine

✓

dipoles on Br_2 or curly arrow to show movement of bonded pair of electrons

✓

intermediate carbonium ion/carbocation

✓

curly arrow from lone pair on the Br^- ion to carbonium ion ($\text{Br}^{\delta-}$ loses 1 mark)

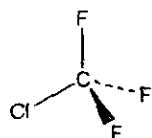
✓

[Total: 10]

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3. (a) (i) C_4H_{10} ✓
- (ii) $C_4H_{10} + 6\frac{1}{2}O_2 \longrightarrow 4CO_2 + 5H_2O$ ✓
(CO_2 & H_2O as products ✓)
- (iii) propan-2-ol ✓
- (b) (i)  *require an attempt at a 3D structure and bond angles must clearly not be 90°.*
require at least one 'wedge' bond or one 'dotted' bond ✓
✓
- (ii) $108 - 111^\circ$ ✓
- (iii) volatile/low boiling/gas/non-toxic/non-flammable/unreactive/liquefied under pressure/inert ✓
- (iv) homolytic = bonded pair split equally/ each retains 1 electron ✓
fission = bond breaking ✓
- (v) C-Cl (no mark) because it is the weaker bond ✓
- (vi) $Cl\bullet$ ✓
 $\bullet CF_3$ (allow $CF_3\bullet$) (*lack of 'dots' penalise once*) ✓

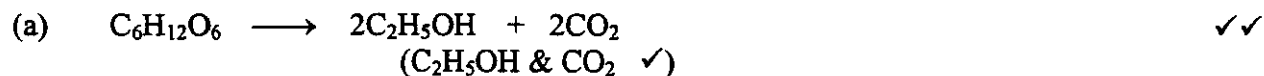
[Total: 12]

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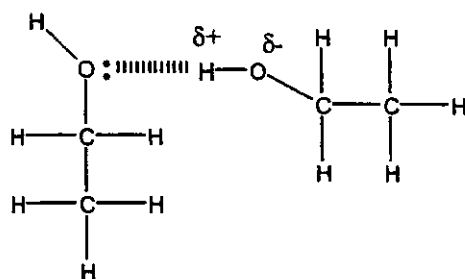
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4.



(b)



dipoles

✓

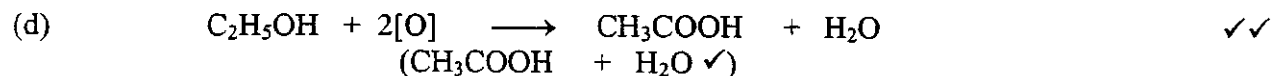
hydrogen bond between O in
one O-H and H in the other O-H

✓

lone pair from O involved in the
H-bond

✓

- (c) (i) (volatile components) can escape/distil out ✓
 ethanal is most volatile/b pt less than 60 °C/partial oxidation ✓
- (ii) (volatile components) cannot escape/ refluxed ✓
 complete oxidation will be achieved/oxidised to the acid ✓



- (e) spectrum C ✓
 spectrum C only shows absorption at 1700 cm⁻¹ for the C=O ✓
 the other two spectra contain the OH group absorption at approx 3000 cm⁻¹ ✓

[Total: 14]

5.

- identifies the three process as cracking, reforming, isomerisation ✓
- recognises the need for high temperature or a catalyst ✓
- equation for cracking ✓
- equation for isomerisation ✓
- state that reforming converts chains into rings/cyclic compounds ✓
- equation for reforming (balanced with H₂ could score two marks) ✓

sub-section mark = 6

- oil is finite/non-renewable ✓
- ethanol is renewable/sustainable ✓
- from plants/crops/sugar cane/sugar beet/glucose/sugar/fermentation ✓
- $C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O$ ✓

sub-section mark = 4

QWC

- organise relevant information clearly and coherently, using specialist vocabulary when appropriate (minimum of 4 from cracking/ isomerisation/ reforming/ renewable/ feedstock/ finite/fermentation/non-renewable/sustainable/zeolite/bimetallic catalyst/ etc)
- reasonable spelling, punctuation and grammar throughout ✓

[Total: 11]