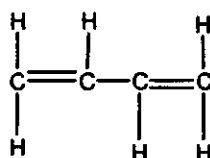
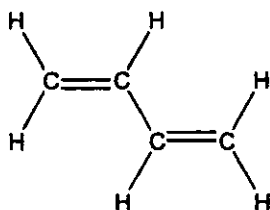




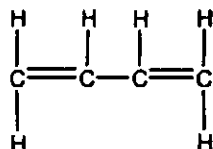
AS CHAINS AND RINGS
Mark Scheme 2812/01
June 2004

- 1 (a)
- (i) C_4H_{10} ✓ [1]
- (ii) C_2H_5O ✓ [1]
- (iii) B and E ✓ [1]
- (iv) A and F ✓ [1]
- (b) $(C_4H_9OH \rightarrow C_4H_8 + H_2O)$ ✓ [1]

(c) any unambiguous formula:



✓ [1]



buta-1,3-diene

name ecf to the structure only if structure above has formula C_4H_8

✓ [1]

[Total : 7]

2(a)

 Cl^- must be shown as a product

✓[1]

(at least 1) lone pair of electrons on the O in the OH^- with curly arrow from the lone pair on the OH^- to the $C^{\delta+}$

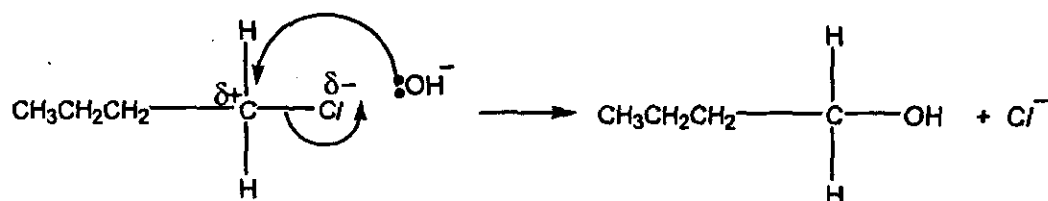
✓[1]

dipoles on the C-Cl bond

✓[1]

curly arrow from C-Cl bond to the $Cl^{\delta-}$

✓[1]

The mechanism below would get all 4 marks.(b) (i) mark for method/dividing by A_r / C, 3.15; H, 6.3; Cl, 1.58.

✓[1]

divide by smallest to get C_2H_4Cl

alternative method:

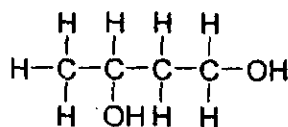
✓[1]

% of each element $\times 127 \div A_r$ of that element = molecular formula, hence deduce empirical formula

✓[1]

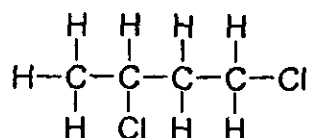
(ii) $C_4H_8Cl_2$

(iii) any unambiguous form of:



✓ [1]

(iv) any unambiguous form of:



✓ [1]

ecf to (iii) provided that there are two OH's in (iii)

Final Mark Scheme

2812/01

June 2004

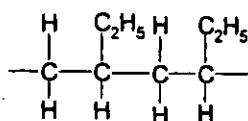
(c) (i) ethanol/ alcohol ✓ [1]

(ii) elimination/dehydrohalogenation/dehydrochlorination ✓ [1]

(iii) any unambiguous form of but-1-ene. ✓ [1]

(iv) $C_4H_9Cl + (Na^+)OH^- \rightarrow C_4H_8 + H_2O + (Na^+)Cl^-$ ✓ [1]

(d)



1 mark is available if the backbone consists of 4 C atoms and a reasonable attempt has been made

✓✓ [2]

(e)(i) reagent J NH_3 ✓ [1](ii) product K HBr/NH_4Br ✓ [1]

(iii) ethanol (as solvent)/high temp(heat) + (high) pressure/heat in a sealed tube ✓ [1]

[Total : 18]

3 (a)

Same molecular formula, different structure /displayed formula/
arrangement of atoms/bonds

✓✓ [2]

(Same formula, different structure/displayed formula/arrangement of atoms ✓ [1])

(b) (i)

3-methylbut-1-ene and 2-methylbut-2-ene
(any unambiguous structure/formula is acceptable)

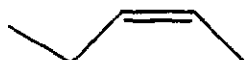
✓✓ [2]

(ii)

2-methylbut-1-ene/2-methyl-1-butene

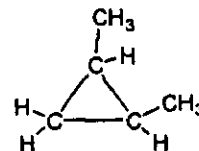
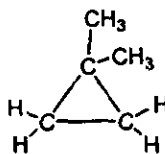
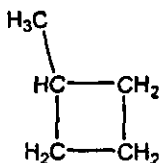
✓ [1]

(iii)

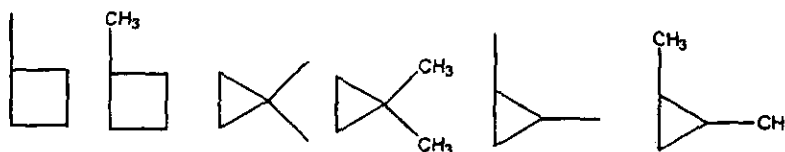


✓ [1]

(c)(i) any two from methylcyclobutane, 1,1-dimethylcyclopropane and 1,2-dimethylcyclopropane



allow



✓✓ [2]

(ii)

cyclopentane

✓ [1]

(iii)



✓ [1]

(d)(i)

homolytic

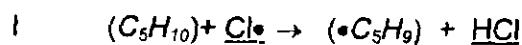
✓ [1]

(ii)

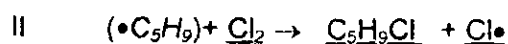
$\text{Cl}_2 \rightarrow 2\text{Cl}\bullet$ (need \bullet on the Cl... penalise only once in the 3 equations)

✓ [1]

(iii)



✓ [1]



✓ [1]

[Total : 14]

- 4.(a) (i) Alkene/C=C ✓ [1]
 Alcohol/ROH/hydroxy/hydroxyl/OH (not OH⁻ or hydroxide) ✓ [1]
- (ii) One of the C in both C=C is joined to two atoms or groups that are the same ✓ [1]
- (b) Observation decolourisation(of Br₂) ✓ [1]
 Molecular formula C₁₀H₁₈OBr₄ ✓✓ [2]
 C₁₀H₁₈OBr₂ gets 1 mark
- (c) reagent CH₃COOH ✓ [1]
 catalyst H₂SO₄/H⁺/HCl (aq) or dilute loses the mark ✓ [1]
- (d)(i) C₁₀H₁₈O + 2[O] → C₁₀H₁₈O₂ + H₂O ✓✓ [2]
 1 mark for H₂O and 1 mark for 2[O]
- (ii) The infra-red spectrum was of compound Y
 because absorption between 1680 – 1750 cm⁻¹ indicates a C=O ✓ [1]
 and the absence of a peak between 2500 – 3300 cm⁻¹ shows the absence of the OH hydrogen bonded in a carboxylic acid ✓ [1]

[Total : 12]

5 Variation in boiling points. (max = 4 marks)

As chain length increases, boiling point increases ✓[1]

due to increased number of electrons/ surface area/ more van der Waals forces /
intermolecular forces/ more surface interactions ✓[1]

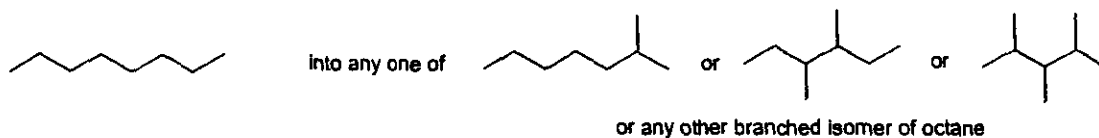
As branching increases, boiling point decreases ✓[1]

straight chains can pack closer together/ straight chains have greater surface area/
more van der Waals forces /more intermolecular forces/ more surface interactions ✓[1]

Isomerisation (max = 4 marks)

(produces) branched chain alkanes ✓[1]

equation to illustrate any isomerisation (of octane) ✓[1]



Branched chains are better/more efficient fuels/used as additives ✓[1]

because they are more volatile/easier to ignite/burn more easily/higher octane
number(rating)/lower boiling points/reduces knocking(pinking) ✓[1]

QWC mark

- use of suitable chemical terms such as van der Waals, intermolecular forces/
intermolecular bonds/volatile/ knocking/ pinking/pre-ignition
- reasonable spelling, punctuation and grammar throughout ✓[1]

[Total : 9]

