

Mark Scheme 2812
January 2006

CHAINS + RINGS

2812

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1(a)

(i) compound/molecule containing hydrogen and carbon **only** ✓(ii) $C_{10}H_{22}$ ✓(iii) C_5H_{11} {ecf from (ii)} ✓

(b)(i) (a particle that) contains/has a single/unpaired electron ✓

(ii) UV (light) /sunlight/high temp ✓

(iii) homolytic (fission)/ homolysis ✓

(iv) $C_{12}H_{26} + Cl\bullet \longrightarrow \bullet C_{12}H_{25} + HCl$ ✓
(the dot for the free radical does not have to be on the C) $\bullet C_{12}H_{25} + Cl_2 \longrightarrow C_{12}H_{25}Cl + Cl\bullet$ ✓

(v) six ✓

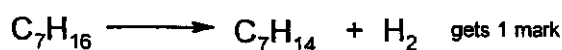
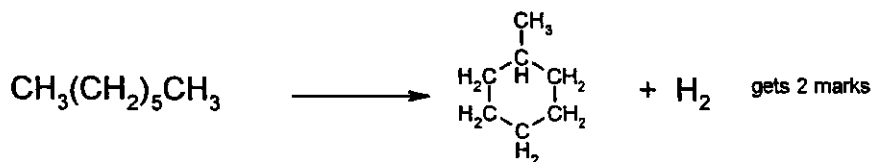
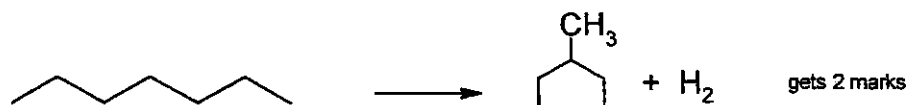
(c)(i) $C_{12}H_{26} \longrightarrow 2C_2H_4 + 1C_8H_{18}$ ✓✓
(1 mark for correct formula of octane or ethene)

(ii) octane/ ecf from (c) (i) ✓

(d)(i)  ✓✓

1 mark for correct reagent and 1 mark for correct product.

(ii) 1 mark for any unambiguous formula of cyclohexane ✓

1 mark for $1H_2$ but check that formula of heptane is correct/equation balanced. ✓

[Total : 16]

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2(a)

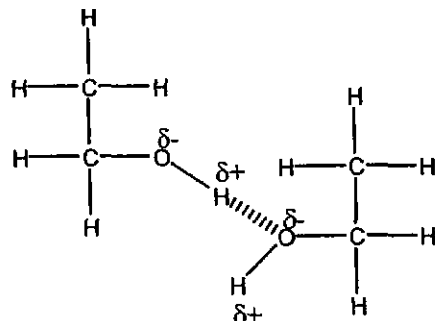
- (i) *low volatility*, = **high boiling point**/ not easy to vapourise/owtte
intermolecular bonds. = bonds/forces/attractions **between** molecules

✓
✓

(ii)

type of intermolecular bond = hydrogen bond

✓



dipoles on both O-H bonds

✓

H-bond shown as a 'dashed bond'

✓

- (iii) (The boiling point of glycerol will be *higher* than ethanol because there are more OH groups ∴ more H-bonds)

✓

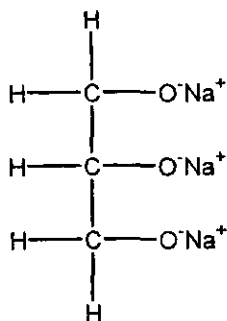
- (b) $C_2H_5OH + Na \longrightarrow C_2H_5O^-Na^+ + \frac{1}{2} H_2$ (or multiple of this)

✓✓

charges are not essential

1 mark for correct formula of sodium ethoxide & 1 mark for correct balancing

(c)



charges are not essential for both marks

✓✓

1 mark for partial reaction, 1 mark if all 3 "ONa" are shown as covalent "O-Na"

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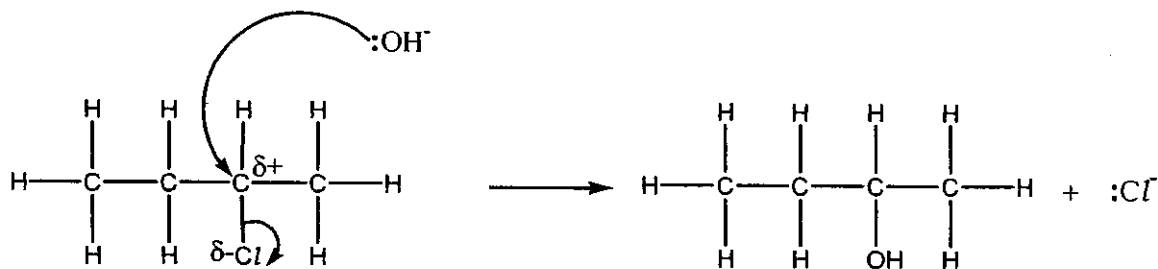
3.

(a)(i)

butan-2-ol by name or by formula

✓

(ii)

curly arrow from the O of the OH^- to $\text{C}^{(\delta+)}$

✓

curly arrow from C-Cl bond to Cl **and** correct dipoles

✓

correct products/ allow NaCl

✓

curly arrow from lone pair on OH^-

✓

 $\text{S}_{\text{N}}1$ route can still score all 4 marks:

[4]

curly arrow from C-Cl bond to Cl **and** correct dipoles

✓

curly arrow from the O of the OH^- to C^+ ion

✓

correct products/ allow NaCl

✓

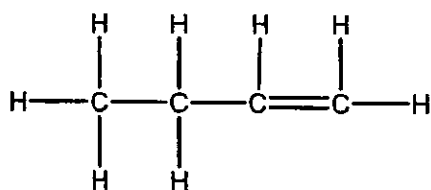
curly arrow from lone pair on OH^-

✓

(b) (i) elimination

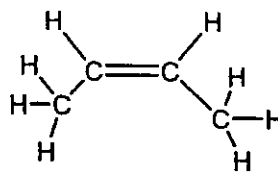
✓

(ii)



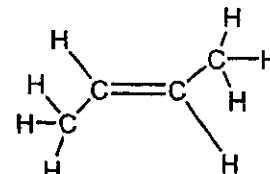
but-1-ene

✓



cis-but-2-ene

✓



trans-but-2-ene

✓

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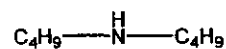
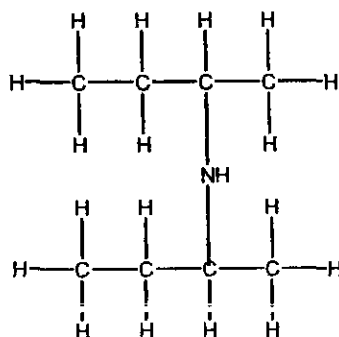
(c) (i) ethanol

✓

(ii) $C_4H_{11}N$

✓

(iii)

any unambiguous structure/ formula
for the secondary amine

✓

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4 (a)(i) alkene ✓

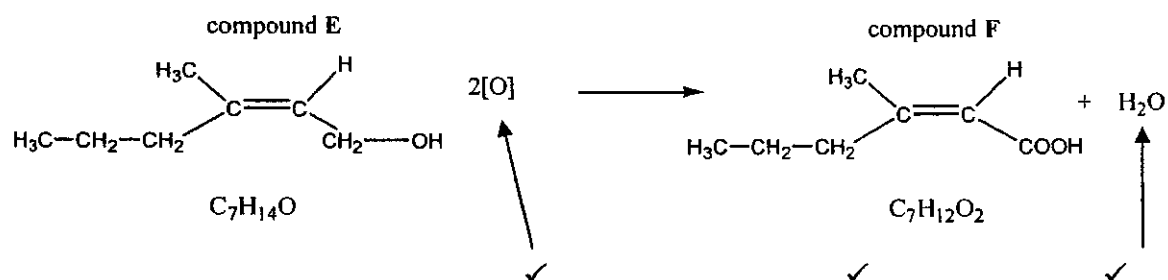
bromine ✓

decolourises ✓

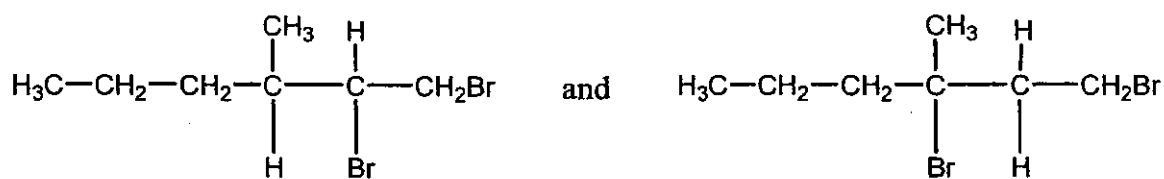
(ii) 3-methylhex-2-en-1-ol/ 1-hydroxy-3-methylhex-2-ene ✓

(b) (i) H^+ ✓ $Cr_2O_7^{2-}$ ✓

(ii)

(iii) carboxylic acid would have an absorption between $1680 - 1750 \text{ cm}^{-1}$ / 1700 cm^{-1} or $2500 - 3300 \text{ cm}^{-1}$. ✓

(c)



1,2-dibromo-3-methylhexane

1,3-dibromo-3-methylhexane

 $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{CHBrCH}_2\text{Br}$ $\text{CH}_3\text{CH}_2\text{CH}_2\text{CBr}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{Br}$

✓

✓

[Total :12]

margarine

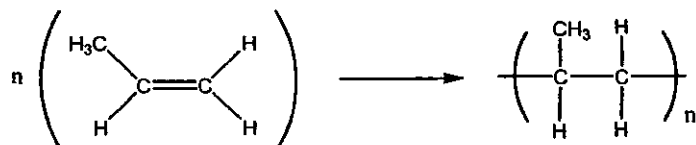
Ni catalyst ✓

hydrogen/ hydrogenated ✓

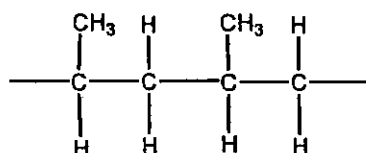
unsaturated vegetable oil/fat ✓

poly(propene)

equation



two repeat units



(Ziegler) catalyst / high temp/heat/use of an initiator ✓

Problems with disposal

non-biodegradable/don't decompose/not broken down by bacteria etc ✓

when burnt produces toxic fumes ✓

Future methods of disposal

recycling (to produce new polymers) ✓

incineration for energy (production) ✓

cracking/owtte (to produce useful organic molecules)

use gas scrubbers to reduce toxic fumes

any two

max = 9

QWC

Answer is well organised/structure and using at least three of:

catalyst, hydrogenation, addition polymerisation, Ziegler, incineration, feedstock, recycling, non-biodegradable, initiator, monomer, unsaturated.

in the correct context.

✓
[Total : 10]