1. 

(a)
$\mathrm{C}_{6} \mathrm{H}_{14}$
(b) (i) boiling point increases with increase in $\mathrm{M}_{\mathrm{R}} /$ molecular formuta/ $\mathrm{N}^{\circ}$ of carbon atoms/chain length
(ii) more intermolecular forces/electrons/surface area/ surface interactions/van der Waal forces
(iii)

$$
120-130^{\circ} \mathrm{C}
$$

(c)(i)
$\mathrm{C}_{9} \mathrm{H}_{20} \longrightarrow \mathrm{C}_{7} \mathrm{H}_{16}+\mathrm{C}_{2} \mathrm{H}_{4}$
(ii)
$\mathrm{C}_{2} \mathrm{H}_{4}+\mathrm{H}_{2} \mathrm{O} \longrightarrow \mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}$
temperature $>100^{\circ} \mathrm{C} /$ steam
phosphoric acid (catalyst)
(d) (i)

(1) $85-98{ }^{\circ} \mathrm{C}$
(e)


(f) more efficient fuel/better fuel/ higher octane number/reduces knocking/more volatile/lower boiling points/burn better/burn more easily/quicker

2
(a) (i) reaction 1
(ii) reaction 4
(iii) reaction 3
(b)
(i) Ione pair/electron pair donor


Correct dipole
$\checkmark$
Curly arrow from the O in the $\mathrm{OH}^{-}$to C in the $\mathrm{CH}_{2}$
$\checkmark$
Curly arrow to show movement of bonded pair in the $\mathrm{C}-\mathrm{Cl}$ bond
$\checkmark$
Cl as a product
(c) (i) same molecular formula, different structure/arrangement of atoms
(same formula, different structure. $\checkmark$ )
(ii)

(d) (i) addition, (not additional)
(ii) poly(propene)/ polypropene/ polypro-1-ene, polypropylene
(iii)


Question 2 c ii should be:-

## Mark Scheme for Unit 2812/01, June 2005 - ERRATUM

See page 9 of the main booklet.
As part of the printing process, two boxes have become corrupted, these should be as shown below.

(a) (i) prop-2-en-1-ol $\mathrm{CH}_{2}=\mathrm{CHCH}_{2} \mathrm{OH}$ must show the $\mathrm{C}=\mathrm{C}$ double bond

## acrolein


must clearly show the aldehyde group and the $\mathrm{C}=\mathrm{C}$ $\checkmark$
(ii) alkene/C=C double bond
(b) (i) acidified $/ \mathrm{H}^{+}$
dichromate $/ \mathrm{Cr}_{2} \mathrm{O}_{7}{ }^{2}$
(ii) $\mathrm{CH}_{2} \mathrm{CHCH}_{2} \mathrm{OH} / \mathrm{C}_{3} \mathrm{H}_{6} \mathrm{O} / \mathrm{C}_{3} \mathrm{H}_{5} \mathrm{OH}+[\mathrm{O}]$
 $\mathrm{C}_{2} \mathrm{H}_{3} \mathrm{CHO}+\mathrm{H}_{2} \mathrm{O}$ not $\mathrm{CH}_{2} \mathrm{CHCOH}$
(c) acrylic acid
approx $1700 \mathrm{~cm}^{-1}$ (range $1650-1750$ ) indicates $\mathrm{C}=\mathrm{O}$
approx $3000 \mathrm{~cm}^{-4}$ (range $2500-3300$ ) indicates $\mathrm{O}-\mathrm{H}$
not $3230-3550 \mathrm{~cm}^{-1}$
(d) (i) $\mathrm{CH}_{2} \mathrm{CHCH}_{2} \mathrm{OOCCHCH}_{2} /\left(\mathrm{C}_{6} \mathrm{H}_{8} \mathrm{O}_{2}\right)$
$\mathrm{H}_{2} \mathrm{O}$
(ii)

or


1 mark if the ester group, 1 mark for the rest of the molecule $\mathrm{COO} / \mathrm{CO}_{2}$ without displaying the ester, they can still get 1 mark.
(a) (i) decolourises/not clear/not discolours

curly arrow from $\mathrm{C}=\mathrm{C}$ to $\mathrm{Br}^{i+}$
dipole on $\mathrm{Br}-\mathrm{Br}$ and curly arrow showing movement of bonded pair of electrons $\downarrow$ correct intermediate/carbonium ion/carbocation and curly arrow from $\mathrm{Br}^{\text {r to }} \mathrm{C}+\checkmark$

1,2-dibromopropane as product
(b)
$\mathrm{CH}_{3} \mathrm{CBr}_{2} \mathrm{CH}_{3}$
$\mathrm{CH}_{3} \mathrm{CHBrCH}_{2} \mathrm{Br}$
$\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CHBr}_{2}$
( $\mathrm{CH}_{3} \mathrm{CHBrCH}_{2} \mathrm{Br}$ has a chiral centre, hence optical isomers of 1,2-dibromopropane are acceptable but must be drawn with 'wedge-shape' bonds and be nonsuperimposable mirror images)
[Total: 8]
(a) Essential marks:
$\left.\begin{array}{ll}\text { Order } & \mathrm{Rl}>\mathrm{RBr}>\mathrm{RCl} / \text { owtte } \\ \text { reason for the order } \\ \text { C-I bond weakestlength/C-Cl bond strongest } \\ \text { and mention/intermolc forces loses the mark }\end{array}\right\}$

Two possible methods of monitoring the reaction

| Method 1 | Method 2 |
| :--- | :---: |
| $\mathrm{AgNO}_{3}$ | AgNO |
| Ethanol \& Waterbath/ <br> /hydroxide <br> temp $40-80^{\circ} \mathrm{C}$ <br> not heat/not bunsen | $\mathrm{NaOH} / \mathrm{OH}^{-}$ |
| relative rate of <br> precipitation | \& neutralise with $\mathrm{HNO}_{3}$ |

(b) Properties:

Non-toxic/harmless
non-flammable
any two from:
(propellant in) aerosols because it is volatile/ unreactive/ non-toxic/easily compressed
blowing polystyrene because it is unreactive
dry cleaning because it is a good solvent for organic material
degreasing agent because it is a good solvent for organic material
fire extinguishers because it is non-flammable

QWC

- reasonable spelling, punctuation and grammar throughout

