M1.(a) C_6H_{14}

1

(b) **A**

1

(c) **B**

1

(d) **C**

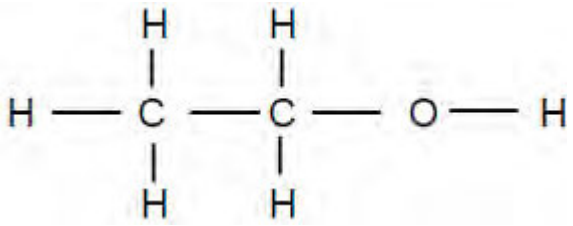
1

(e) Propanol

1

[5]

M2.(a) (i)



allow other arrangements provided connectivity is correct

allow —— *OH*

1

(ii) oxygen

accept O_2

allow O

1

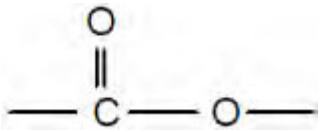
oxidation

allow oxidisation / oxidising / oxidised

allow redox

1

(b) (i) ring around



1

(ii) ester(s)

*do **not** allow ether(s)*

1

(iii) propanol

propanol accept propan-1-ol

allow propyl alcohol

1

[6]

M3. (a) kills bacteria / sterilises (water)

allow kills microorganisms / microbes / germs
*allow 'makes (water) safe (to drink)' **or** disinfectant*
*ignore cleans water **or** removes impurities / bacteria*

1

(b) goes colourless / decolourised (from red / red-brown / brown / yellow / orange)

allow colour disappears
*ignore 'goes clear' **or** discoloured*
*do **not** accept incorrect initial colour*
*do **not** accept precipitate*

1

(c) (i) Br_2 **and** $2Cl^-$

allow multiples / fractions if whole equation balanced

1

(ii) changes to red / red-brown / brown / yellow / orange

*do **not** accept effervescence / fizzing / precipitate / gas given off*
ignore vapour / temperature changes / ignore initial colour

1

(d) (i) 7 <u>outer</u> electrons **or**

same number of <u>outer</u> electrons

allow last / final shell for outer
allow energy level / orbit / ring for shell
allow 'need to gain 1 e^- to have a full outer shell'
ignore 'similar number of outer electrons'

1

(ii) bromine / it (atom) is <u>bigger</u> **or**

must be a comparison

outer electrons (level / shell) further from nucleus **or** more shells

*do **not** accept more outer shells*
ignore more electrons

forces / attractions are weaker **or** more shielding **or** attracts less

*do **not** accept magnetic / gravitational / intermolecular forces*
allow 'electron(s) <u>attracted</u> less easily'

electron(s) gained <u>less</u> easily

*"outer / last / final" must be mentioned once, otherwise max **2** marks.*
accept converse for chlorine throughout where clearly stated

3

(e) (i) white precipitate **or** white solid

ignore names of chemicals

1

(ii) cream precipitate **or** cream solid

allow <u>pale</u> yellow / off-white precipitate / solid
ignore names of chemicals

1

[10]

M4. (a) not broken down by microorganisms **or** not bio-degradable

accept alternative answers such as:
do not rot / corrode / fade / react with atmosphere etc
any answers which imply the inertness or non-biodegradability of this plastic
accept they don't react, they are 'inert'
ignore rusting
*do **not** accept weathering*

1

(b) (i) (have a) double bond **or** do not have maximum number of (hydrogen) atoms attached

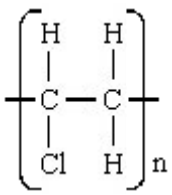
accept can add / react with hydrogen
accept can take part addition reactions
*do **not** accept it is a double bond*
*do **not** accept additional reactions*
*do **not** accept has 'spare' / 'free' bond*
*do **not** accept alkene alone*

1

(ii) single bond between carbon atoms

1

all atoms correct + 2 'linking' bonds
(linking bonds need not go through bracket)



1

n moved to bottom right of <u>bracket</u> i.e. is below $\frac{1}{2}$ way on the right

first 2 marks are possible for chain structures
accept $[– CHCl–CH_2–]_n$

1

(iii) many molecules **or** many monomers

1

joined / bonded / linked **or** form long chain molecules / large molecules **or** to form a long chain polymer

*accept many alkenes **or** many (ethene) molecules*

*do **not** accept many ethene alone etc.*

to form a long polymer is not enough for 2nd mark

1

(iv) no other substances formed
(A + B → C)

allow because double bond breaks so other atoms can add
allow one product only

*do **not** accept saturation occurs*

1

[8]

M5. (a) (i) by heating

pressure is neutral

using a catalyst/pot/ceramic/porcelain/aluminium oxide

1

(ii) use bromine water/(alkaline) permanganate

accept bromine

1

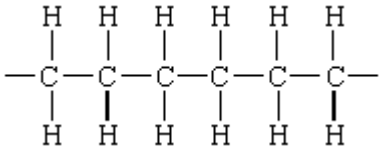
alkene makes bromine go colourless or lose its colour

accept alkane does not change the red/orange colour of bromine

***not** change colour/goes clear*

1

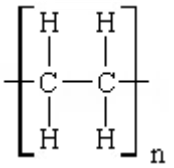
(b) (i)



either of these must show bonds at end

1

or



***not** H on ends*

*allow 3 instead of n **not** any other number*

(ii) poly(ethene) – brackets not essential

accept polythene

1

(iii) **large amount** of waste polymer/poly(ethene)/polythene/litter

*accept large amount of crude oil **or** finite resource used*

1

it is not biodegradable

accept it does not

decompose/decay/break down

it causes pollution/it creates toxic

fumes when burnt are neutral

***not** it is not recyclable*

2

[8]

M6. air/gases
oxygen O_2
chemical change/reaction
gases
carbon dioxide/CO_2
water [vapour] H_2O
(heat or heat energy or energy)

for 1 mark each

[7]

M7. (a) fuels
heat – allow light

for 1 mark each

2

(b) gases

for 1 mark

1

[3]