M1.(a) hydrocarbons **or** hydrocarbon

1

(b) (i) distillation

1

(ii) evaporation

1

(iii) condensation

1

(c) (i) bond

1

(ii) $(C_6H)_{14}$

1

(iii) cracking

1

(d) (i) poly(butene)

allow with or without brackets

1

(ii) Advantage = energy is released

*do **not** accept more than one tick in the advantage column*

1

Disadvantage = carbon dioxide is produced

*do **not** accept more than one tick in the disadvantage column*

1

[10]

M2.(a) (i) (1)

5

3

(6)

4

2

all numbers in the correct order gains both marks

*any two numbers in the correct position gains **1** mark*

2

(ii) Water

ignore formula if correct name given

accept hydrogen oxide

allow H_2O

1

carbon dioxide

allow CO_2

*accept carbon monoxide / CO **or** carbon / C*

1

(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.Examiners should also apply a best-fit approach to the marking.

0 marks
No relevant content.

Level 1 (1-2 marks)
There is a **basic** description of at least one advantage **or** one disadvantage caused by using plastic shopping bags made from poly(ethene)

Level 2 (3-4 marks)
There is a **clear** description of both an advantage **and** a disadvantage,caused by using plastic shopping bags made from poly(ethene).

Level 3 (5-6 marks)

There is a **detailed** description of both advantages **and** disadvantages caused by using plastic shopping bags made from poly(ethene)

examples of the chemistry/social points made in the response:
ignore cost unqualified

Advantages:

- Simple properties eg strong / low density / water resistant
- Bags can be reused (for shopping) **or** another specified use eg bin liners
- Money charged for bags can go to good causes **or** encourage reuse
- Poly(ethene) bags can be recycled eg made into milk bottle crates
- Poly(ethene) bags can be burned to provide heat for buildings/generation of electricity
- New bags are now made that can biodegrade

Disadvantages:

- (Older) bags can take many years to biodegrade
- There is a shortage of landfill space
- Bags are made from (crude) oil which is a non-renewable resource/running out
- Large amounts of energy/fuel are used for the production of poly(ethene)
- Production of poly(ethene) releases carbon dioxide/causes global warming
- Specified issue caused by litter eg visual pollution or effect on wildlife
- Burning bags release carbon dioxide / causes global warming

6

[10]

M3. (a) (i) hydrocarbons

accept alkanes

1

(ii) distillation

1

(b) (i) vaporising

1

(ii) cracking

1

(c) B

1

(d) (i) new plastic products are made from the used plastic bags

1

(ii) not biodegradable

accept does not decompose

allow does not rot

1

(iii) advantage – energy is released

1

disadvantage – carbon dioxide is produced

1

[9]

M4. (a) (i) carbon

1

hydrogen

accept in either order

ignore number eg 2 carbons

4 hydrogens

1

(ii) (a carbon carbon) double (bond)

1

(b) poly(ethene)

1

(c) any **two** from:

ignore pollution / cost / global warming / harms environment / recycling

- made from crude oil
- non-renewable resources

  accept resources are running out
- litter

  accept go to landfill
- not biodegradable
- use energy to make
- when burned or biodegraded carbon dioxide is released
- encourage customers to reuse bags / use their own bags

  accept reduces carbon emissions / footprint

2

[6]

M5. (a) (i) any **one** from:

- bond / join (together)
  ignore polymerisation / heat
- double bond opens

1

(ii) any **one** from:

- heat / energy
  ignore many processes / distillation / cracking / polymerisation
- cost of fuels / the crude oil
- construction of the factory / plant
- wages / salaries

1

(iii) any **two** from:

ignore gases released / burning / habitats

- non-biodegradable
  accept remains a long time
- landfill sites are filling up / limited
  accept land / space used up
- waste of a resource / could be recycled / reused
  accept crude oil is running out

2

(b) any **two** from:

- renewable / sustainable
  ignore recycling
  ignore crude oil is running out
- less fuel <u>burned</u>

accept less energy / heat needed

- biodegradable
- natural resource
- plants absorb carbon dioxide

2

[6]

M6. (a) (i) C_2H_4

1

(ii) poly(ethene)

1

(b) (i) is not biodegradable

1

(ii) not enough landfill sites / space

*accept landfill sites are filling up **or** plastics remain for <u>years</u> **or** plastics not broken down*

ignore cost / waste of resources / not biodegradable / wildlife

1

(iii) less (crude) oil / fuels / energy used

accept (crude) <u>oil</u> is a non-renewable resource

1

[5]

M7. (a) (i) hydrogen

must be name

1

(ii) a line of four or more ethene molecules joined to the original two with single bonds

*at least two other ethene molecules joined to the original two in a chain gains **1** mark*

2

(b) (i) any **two** from:

- non-biodegradable
  accept remains a long time
- landfill sites are filling up / limited
  accept land / space used up
- waste of a resource / could be recycled / reused
  ignore references to tablets / animals

2

(ii) any **one** from:

- (two) different polymers / plastics / materials
- need to be separated
- limited collection points / many need to be collected
- tablets may still be present

1

[6]