M1.(a) C_5H_{12}

1

(b)   Alkanes

1

(c)   (3) CO_2

1

(4) H_2O

1

*allow for **1** mark*
4 CO₂ + 3 H₂O

(d)   contains hydrogen and carbon

1

(hydrogen and carbon) <u>only</u>

1

(e)   *(diesel)*
produces more oxides of nitrogen
    allow converse answers in terms of petrol

1

produces (more) particulate matter

1

produces less carbon dioxide

1

Page 2

(f)

Oxides of nitrogen	Acid rain
	Flooding
	Global dimming
Particulate matter	Global warming
	Photosynthesis

Oxides of nitrogen — Acid rain

Particulate matter — Global dimming
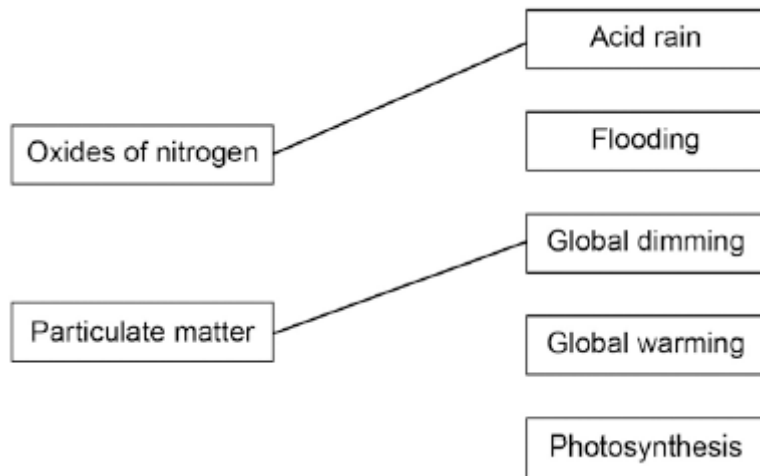
2

[11]

M2.(a) (i) mixture (of different substances)

1

(ii) boiling (points)

1

(iii) distillation

1

(b) (i) combustion

1

(ii) (reactant)

oxygen

allow correct formulae

1

(products)

products in any order

carbon dioxide

allow carbon or carbon monoxide
and
water

allow water vapour or steam or hydrogen oxide

1

(iii) (burning sulfur) produces sulfur dioxide / SO_2

allow it / sulfur reacts with oxygen ignore sulfur oxide

1

causes acid rain

1

(c) (i) propane is a fuel

1

(ii) double bond drawn between carbon atoms

do not allow any other bonds or symbols

1

(iii) orange to colourless

1

(iv) poly(pentene)

Page 4

allow polymer(s)

1

[12]

M3. (a) (i) bar drawn between 84 and 86

1

(ii) sulfur dioxide linked to acid rain

1

carbon particles linked to global dimming

1

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

- plants / trees <u>absorb</u> (carbon dioxide)

- coal '<u>locks up</u>' (carbon dioxide)

1

(ii) it <u>increases</u> the amount (of CO_2)

1

because carbon in coal (forms carbon dioxide)
accept because carbon / coal burns / reacts <u>with oxygen</u> (to produce CO_2)

1

[6]

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M4. (a) (i) increase

                            1

      (ii) energy is given out to the surroundings

                            1

    (b) (i) NO

                allow 2NO

                ignore nitrogen oxide

                *do **not** allow equations*

                            1

      (ii) harmful / poisonous (owtte)

                allow dangerous

                ignore reference to pollution / global warming

                *do **not** accept references to ozone layer*

                            1

    (c) a catalyst can speed up a chemical reaction

                            1

      different reactions need different catalysts

                            1

    (d) (i) small<u>er</u>

                accept less / tiny / very small

                allow 10^{-9}

                *do **not** allow small unless qualified*

                            1

      (ii) reduce cost (owtte) **or**

ignore references to energy

save resources / raw materials (owtte)

1

[8]

M5. (a) sulfur dioxide / SO$_2$

allow sulfur oxide

1

(b) global dimming

1

(c) oxygen / O$_2$

1

(d) (oil is a) limited resource / finite / non-renewable

*accept running out of oil **or** wood is sustainable*

*accept (burning oil) increases amount of carbon dioxide in the atmosphere / global warming **or** releases locked up carbon / global dimming / acid rain*

accept the oil (may become) too expensive

1

(e) carbon dioxide produced (from burning wood)

ignore global warming

1

carbon dioxide used by plants / trees **or** for photosynthesis

if no other mark awarded

*allow carbon emissions used by plants / trees **or** for photosynthesis for **1** mark*

1

[6]

M6. (a) acid rain → sulfur dioxide

1

global warming → carbon dioxide

1

global dimming → carbon particles

1

(b) (i) oxygen

1

(ii) carbon monoxide

1

(c) (i) decreasing

accept running out / none left

1

(ii) any **two** from:

it = coal

- world needs (more) energy
  accept population is increasing
  allow (greater) demand for coal / fuels / energy

- plentiful supply
  accept readily available
  allow coal will 'last longer'

- (many) countries have coal

- easy to find / extract

- oil / gas is running out

Page 10

accept need to use less oil / gas

accept need to use it to replace oil / gas

- cheap **or** cheaper than oil

2

[8]

M7. (a) good (electrical) conductor

> *allow low reactivity / resistance to corrosion*
>
> *do **not** accept <u>heat conductor</u>*

1

(b) a mixture of metals

> *accept contains more than one type of metal*

1

(c) (i) any **one** from:

- eyesore

- destruction of <u>habitats</u>

- pollution of water

- dust pollution

- noise

- traffic pollution

1

(ii) acid rain

> *allow sulfur dioxide is a pollutant*

1

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(d) (i)   running out of copper (ores)

1

     (ii) any **two** from:

          • any <u>specific example</u> of using less copper

          • reuse / recycle
            *allow do **not** throw copper / brass away*

          • use low-grade copper ores

          • use other metals / materials in place of copper

2
[7]