

M1.(a) any **one** from:

- there was a flame
- energy was given out
- a new substance was formed
- the magnesium turned into a (white) powder

answers must be from the figure

1

(b) Magnesium oxide

1

(c) The reaction has a high activation energy

1

(d) 9

1

(e) They have a high surface area to volume ratio

1

(f) any **one** from:

- Better coverage
- More protection from the Sun's ultraviolet rays

1

(g) any **one** from:

- Potential cell damage to the body
- Harmful effects on the environment

1

(h) indication of $\frac{1}{1.6} = 0.625$

and

use of indices $10^{-9} - 10^{-6} = 10^3$

Both steps must be seen to score first mark

1

$0.625 \times 1000 = 625$ (times bigger)

1

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M2.(a) (i) 11

1

(ii) 4620 (J)

correct answer gains 2 marks with or without working

allow 4.62kJ for 2 marks

if answer is incorrect:

100 × 4.2 × 11 gains 1 mark

or

100 × 4.2 × (their temp. rise) gains 1 mark

or

100 × 4.2 × (their temp. rise) correctly calculated gains 2 marks

2

(b) the temperature increases

allow gets hotter

allow heat / energy is given off

1

(c) (i) (energy of) products lower than (energy of) reactants

allow converse

allow arrow C points downwards

1

(ii) A

1

[6]

M3.(a) heat / energy

1

given out / transfers to surroundings

*the mark for given out / transfers to cannot be awarded without
heat / energy*

allow given off

1

(b) (i) decreases

1

increases

1

(ii) it gives the particles more energy

1

it makes the particles move faster

1

[6]

M4.	(a)	22	1
	(b)	(i) exothermic	1
		(ii) C	1
		gives out most heat energy <i>accept has largest temperature change / increase</i> <i>allow has highest (final) temperature or hottest</i>	1
	(c)	(i) increases	1
		(ii) blue <i>ignore pale / dark etc</i>	1
		(iii) reversible (reaction) <i>allow goes both ways or two / either way</i>	1
		(iv) <u>anhydrous</u> copper sulfate	1

[8]

M5. (a) (i) the temperature at start
ignore reference to bubbles / heat 1

the temperature at end
(measure) the temperature rise / change = 2 marks
(measure) the temperature 1 mark 1

(ii) temperature would increase
allow it gets hot(ter) / warm(er) or heat given off
allow energy released / transferred 1

(b) any **one** from:

- volume of acid
allow amount
allow liquid
- temperature of acid
- size of magnesium ribbon
allow volume / mass / amount
- surface area of magnesium
ignore size of test tube and reference to water

1

(c) (i) (Test tube) B 1

(ii) produces bubbles faster
accept more bubbles

or
faster rate of reaction
allow most reactive

1

(d) The particles move faster

1

The particles collide more often

1

[8]

- M6. (a) (i) increase 1
- (ii) energy is given out to the surroundings 1
- (b) (i) NO 1
allow 2NO
ignore nitrogen oxide
*do **not** allow equations*
- (ii) harmful / poisonous (owtte) 1
allow dangerous
ignore reference to pollution / global warming
*do **not** accept references to ozone layer*
- (c) a catalyst can speed up a chemical reaction 1
- different reactions need different catalysts 1
- (d) (i) smaller 1
accept less / tiny / very small
allow 10⁹
*do **not** allow small unless qualified*
- (ii) reduce cost (owtte) **or**

ignore references to energy

save resources / raw materials (owtte)

1

[8]

M7. (a) (i) 4 1

(ii) (Make) 3 1

biggest temperature rise 1

(b) (i) 1008 (kJ) 2
correct answer with or without working gains 2 marks
if incorrect answer given allow evidence of 240×4.2 for 1 mark

(ii) crisps have a high energy content 1
allow crisps have lots of calories / kilojoules / fat / one ninth of daily energy intake

so if you take in more energy than you need the excess is stored as fat
accept consequences: obesity; heart disease; high blood pressure; diabetes; arthritis

or

crisps contain salt (1)

too much salt can cause high blood pressure **or** heart problems or kidney problems (1)

1

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- M8.** (a) goes up 1
- (b) (i) B 1
- (ii) A 1
- (iii) a catalyst 1
- activation energy 1
- (c) (i) eg (ensures) complete reaction
allow spread heat / energy
or even heating
allow mixes properly or mix them together or to get correct temperature
ignore dissolves 1
- (ii) lid (on beaker)
accept cover beaker
or
insulate (beaker) / use a plastic cup 1

[7]