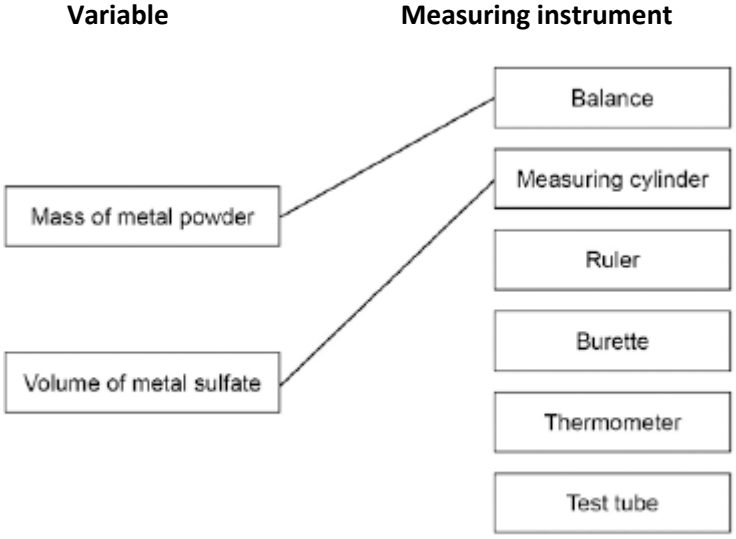
M1.(a) Whether there was a reaction or not

1

(b) brown / orange / dark deposit on zinc
or
blue solution turns colourless / paler

1

(c)



more than one line drawn from a variable negates the mark

2

(d) (Most reactive) **Magnesium**
Zinc
(Least reactive) **Copper**
must all be correct

1

(e) would not be safe **or**

too reactive
allow too dangerous

1

(f) Gold

1

(g) $2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$

allow multiples

1

(h) carbon

1

(i) Loss of oxygen

1

[10]

M2.(a) any **two** from:

- concentration / volume of dilute hydrochloric acid
- mass of metal powder
- surface area of metal powder
- stirring (of any) / rate of stirring

allow reacted for the same length of time

2

(b) 4.2 °C

allow Magnesium Test 2

1

and any **one** from:

- lower mass of magnesium added
- surface area of magnesium too low
- magnesium coated in magnesium oxide (so took a while to start reacting)
- not stirred
- not stirred as quickly as the other metals
- not reacted for as long a time as the other metals

allow reason for break in circuit

1

(c) 17.4(°C)

1

(d) bubbles of gas

1

more (bubbles) seen with calcium than other metals

allow any correct comparison between two metals

1

(e) any value between 7.9 °C and 12.3 °C

1

[8]

M3.(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 × 1000 = 625 (times bigger)

1

[9]

M4.(a) (i) economical

1

(ii) phytomining

1

(iii) carbon dioxide

1

(b) (i) copper / Cu

1

iron sulfate / $FeSO_4$

1

(ii) copper / ions have a positive charge

it = copper ions

allow copper ions have a different charge

accept copper / ions are free to move

accept to gain electrons

*accept copper / ions are attracted to the negative electrode **or** opposite charges attract*

1

(c) any **two** from:

ignore not biodegradable or does not decay

- copper ores are limited / running out

  allow copper is running out
- copper can be recycled
- copper can be reused
- copper is expensive
- landfill sites are filling up
- copper compounds are toxic

  allow copper is toxic

2

[8]

M5.(a) (i) copper / Cu

1

(ii) 50 (p)

1

(iii) 25

1

(iv) tin

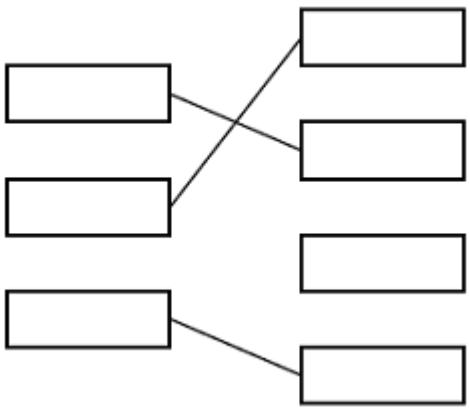
1

(b) any **one** form:

- high cost of copper
  allow metal is expensive
- less copper available **or** (copper ores exhausted / **only** low-grade ores available)
  allow copper is non-renewable
- high demand for copper
- high percentage (%) of copper in the coin
- inflation (of cost)

1

[5]



M6.(a)

one mark for each substance linked correctly to its description

*do **not** accept more than one line from each substance*

3

(b) 0 / zero / none / no charge

1

electron

1

(c) (i) nucleus

1

(ii) atomic number

1

(iii) mass number

1

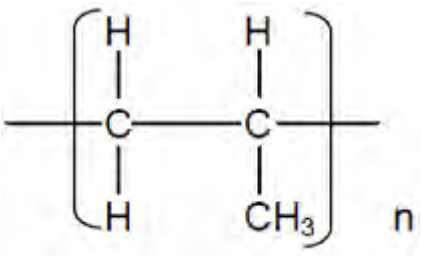
[8]

M7.(a) (i) ethene

allow C_2H_4

1

(ii)



accept line drawn from word 'Monomer' or from the monomer box to the correct 'Polymer'

allow the correct 'Polymer' indicated by a tick, circled etc.

1

(b) (i) nickel

accept Ni

1

(ii) 75(%)

1

(iii) (stainless steel) is hard /strong / durable

it = stainless steel

accept (pure) iron is soft

1

(stainless steel) resistant to corrosion **or** unreactive

accept (pure) iron rusts / corrodes / reacts

*do **not** allow corrosive*

1

(c) **Advantage** : Conserves resources of crude oil and ores

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

1

Disadvantage : High cost of separating materials

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

1

[8]