KS3 Science

Chemical Reactions

Mark Scheme

Time available: 41 minutes
Marks available: 50 marks

1. (a) any **three** from

- copper
- oxygen
- sulphur
- hydrogen

accept chemical symbols
'Cu'
'O'
'S'
'H'
*do **not** accept 'O $_2$' **or** H_2'*

3 (L6)

(b) (i)
- they both contain oxygen

accept 'they both have O in them'
*do **not** accept 'they have O $_2$ in them'*

1 (L6)

(ii) any **one** from

- hydrochloric acid does not contain oxygen

accept 'it does not contain oxygen'
'he was wrong' is insufficient

- hydrochloric acid is not formed from oxygen

accept 'not all acids contain oxygen'
accept 'no oxygen'

1 (L6)

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

- they both produce hydrogen (when they react with metals)
- different metals produce the same gas

accept 'there is hydrogen left at the end'
'they contain hydrogen' is insufficient
'hydrogen is in the equation' is insufficient

1 (L6)

(ii) • iron chloride
hydrogen

*accept 'FeCl $_2$' **or** 'FeCl $_3$' **or** 'Cl $_2$Fe'*
accept 'H $_2$'
***both** answers are required for the mark*
answers may be in either order
*do **not** accept 'iron + chloride'*

1 (L6)

[7]

2. (a) (i) any **one** from

- iron
- copper

accept calcium

1 (L5)

(ii) any **one** from

- sulphur
- chlorine

*accept 'oxygen' **or** 'carbon'*

1 (L5)

(iii) any **two** from

- calcium carbonate
- calcium oxide
- carbon dioxide
- iron sulphide

accept 'copper chloride'
answers may be in either order
***both** answers are required for the mark*

1 (L6)

(b) any **one** from

- the iron reacted **or** combined with sulphur

  accept 'the iron gained sulphur'
  or *'sulphur was added to the iron'*

  accept 'the iron has joined with the sulphur'
  *do **not** accept 'iron has mixed with the sulphur'*

  *do **not** accept 'sulphur or iron added a new layer'*

- the sulphur had mass

  accept 'the sulphur weighed 0.8 g'

1 (L6)

(c) copper chloride

1 (L6)

[5]

3. (a) (i) *magnesium* + hydrochloric acid →

1 (L7)

→ magnesium chloride + hydrogen

*do **not** accept 'hydrogen chloride'*

*do **not** accept formulae*

1 (L7)

(ii) magnesium is more reactive than hydrogen **and** copper is less reactive than hydrogen

accept 'magnesium is more reactive than copper'

accept 'copper is less reactive than magnesium'

accept 'magnesium is higher than copper in the reactivity series'

accept 'copper is lower in the reactivity series'

1 (L7)

(b) sulphuric

1 (L7)

(c)

formula	name
$CuSO_4$	copper sulphate
$MgCl_2$	magnesium chloride

2 (L7)

[6]

4. (a) it neutralises it

accept 'neutralisation'

accept 'it produces heat'

1 (L6)

(b) (i) 3

1 (L7)

(ii) 9

1 (L7)

(c) nitric acid → water

answers must be in the correct order

2 (L7)

[5]

5.

(a) (i) $2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$

1

(ii) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

one mark is for the formula Na_2SO_4

one mark is for the formula H_20

one mark is for balancing the equation

3

(b) 3

1

[5]

6.

(a) lead sulphide

1

calcium fluoride

answers must be in the correct order

1

(b) (i) $2PbS + 3O_2 \rightarrow 2PbO + 2SO_2$

1

(ii) any **one** from

- $PbO + C \rightarrow Pb + CO$
- $2PbO + C \rightarrow 2Pb + CO_2$

1

(iii) it removes the oxygen from the lead oxide

accept 'it removes the oxygen from the lead'
***or** 'it removes the oxygen'*

*accept 'it reduces the lead oxide' **or** 'it is oxidised'*
***or** 'it combines with the oxygen'*

accept 'the carbon displaces the lead in the lead oxide'

1

(c) (i) 9 g

the unit is required for the mark

1

(ii) 28 g

the unit is required for the mark

1

[7]

7. (a) (i) sodium carbonate

1 (L4)

(ii) nickel sulphate

1 (L4)

(iii) calcium sulphate

1 (L4)

(b) both nickel compounds are green

1 (L5)

the other carbonate compounds are not green

answers may be in either order
accept 'nickel sulphate is green'
accept the converse
accept 'calcium carbonate is white'
***or** 'sodium carbonate is white'*

1 (L5)

[5]

8. (a) (i) Fe_2O_3

*accept 'iron oxide' **or** 'iron (III) oxide'*
*or 'haematite' **or '** iron ore'*
*do **not** accept 'iron (II) oxide'*

1

(ii) CO

*accept 'carbon monoxide' **or** '3CO'*

1

(b) **the answer must refer to carbon and oxygen and must not be a general statement on oxidation and reduction**

carbon dioxide **or** CO_2 loses oxygen so is reduced

accept 'CO $_2$ is reduced'

1

carbon **or** C gains oxygen so is oxidised

accept 'C is oxidised'
accept 'oxygen is lost from carbon dioxide and gained by carbon 'for one mark only accept a description in terms of electron loss and gain if it is correctly related to carbon and oxygen

1

[4]

9. (a) fertilisers

1

(b) air

1

(c) speeds up the reaction

accept lowers the activation energy
ignore makes the reaction work

1

(d) reversible reaction

1

(e) (i) 10

1

(ii) water

accept H_2O / hydrogen oxide

1

[6]