



# **KS3 Science**

## **Word Equations**

### **Mark Scheme**

**Time available: 39 minutes**

**Marks available: 56 marks**

## Mark schemes

1.

- (a) carbon dioxide  
*accept 'CO<sub>2</sub>'*  
1 (L6)
- (b) between 0 s and 30 s ✓  
*if more than **one** box is ticked, award no mark*  
1 (L6)
- (c) (i) any answer from 41 to 45  
1 (L7)
- (ii) 33 g  
*accept '176 – 129 – 14'*  
*accept '176 – 143'*  
*do **not** accept incorrect calculations,*  
*e.g. '176 – 129 – 14 = 34'*  
1 (L7)
- (d) when the balls get wet the chemicals will react (and destroy the ball)  
*accept 'they are biodegradable'*  
*accept 'they will dissolve'*  
*accept converse answers regarding normal golf balls*  
*accept 'the products are harmless'*  
1 (L7)
- (e) calcium citrate  
carbon dioxide  
*accept 'CO<sub>2</sub>'*  
***both** answers are required for the mark*  
*answers can be in either order*  
1 (L7)

[6]

2.

- (a) (i) sodium carbonate  
*'Na<sub>2</sub>CO<sub>3</sub>' is insufficient*  
1 (L7)
- (ii) 18  
1 (L7)
- (iii) 88  
1 (L7)

- (b) (i) carbon dioxide sinks  
*accept 'the density of carbon dioxide is greater'*  
*'carbon dioxide is heavy' is insufficient*  
*'carbon dioxide is heavier than air' is insufficient*
- 1 (L7)

any **one** from

- it prevents oxygen reaching the fire  
*accept 'fire is starved of oxygen'*  
*do **not** accept 'air' in place of oxygen*
- carbon dioxide displaces (air containing) oxygen  
*'it takes away oxygen' is insufficient*  
*'the carbon dioxide keeps oxygen away from the fire' is insufficient as this implies it is an active process*  
*'it suffocates **or** covers the fire' is insufficient*

1 (L7)

- (ii) energy **or** heat is needed to evaporate the water  
*accept 'taking heat out of the fire'*  
*'it makes the temperature less' is insufficient*  
*'water cools the fire down' is insufficient*

1 (L7)

**[6]**

**3.**

- (a) (i) • sodium chloride + • water  
*accept 'hydrogen oxide' for water*  
*answers must be in the correct order*
- 2 (L7)
- (ii) • H<sub>2</sub>O
- 1 (L7)

(b) any **one** from

- the same atoms are present in the reactants and the products  
*accept 'mass is conserved'*  
*'the mass did not change' is insufficient*  
*'the particles are the same' is insufficient*  
*do **not** accept 'the molecules are the same'*
- no gas was given off  
*accept 'nothing was added **or** lost'*

1 (L7)

- (c) (i) • sodium chloride  
carbon dioxide  
water

*answers may be in any order*  
**all three** answers are required for the mark

1 (L7)

- (ii) any **one** from

- carbon dioxide **or** gas escapes  
*'mass is lost' is insufficient as it is given in the question*
- carbon dioxide is a gas
- one of the products is a gas **or** escapes

1 (L7)

[6]

4.

- (a)

liquid	acidic	neutral	alkaline
alcohol		✓	
dilute hydrochloric acid	✓		
distilled water		✓	
vinegar	✓		
sodium hydroxide solution			✓

*award one mark for a correct tick for*  
**both** alcohol and distilled water  
*award one mark for a correct tick for*  
**both** vinegar and sodium hydroxide solution  
*if more than one column is ticked for any liquid*  
*award no mark for the corresponding pair of liquids*

2 (L5)

- (b) (i) any **one** from
- to clean the probe **or** it
  - to prevent contamination
  - to get an accurate reading
  - so the liquids do not get mixed up
  - it is neutral
    - accept 'to neutralise the probe' **or** 'so that it does not affect the other liquids' **or** 'to make it pH 7'*
    - 'to make it a fair test' is insufficient*
- 1 (L5)
- (ii) alcohol
- accept 'the first **or** top one'*
- 1 (L5)
- (c) (i) hydrochloric acid has a lower pH **or** is more acidic
- accept the converse*
- accept 'vinegar is a weak acid'*
- 'vinegar is a weaker acid' is insufficient*
- 1 (L5)
- (ii) any **one** from
- more bubbles would be given off
    - accept 'more bubbles' **or** 'more fizzing'*
  - bubbles would be given off more rapidly
  - there would be a bigger rise in temperature
    - accept 'there would be a rise in temperature'*
    - or** 'the test-tube would get hot'*
  - the magnesium would be used up more quickly
- 1 (L5)
- (d) (i) • magnesium chloride +
- 1 (L6)
- hydrogen
    - answers may be in either order*
- 1 (L6)

(ii) any **one** from

- the acid was used up  
*accept 'there were no reactants left'*
- the magnesium was used up  
*accept 'one of the reactants has been used up'*  
*accept 'the reaction was complete'*  
*do not accept 'the magnesium had dissolved'*

1 (L6)

[9]

5.

(a) (i) *magnesium* + oxygen → magnesium oxide  
*do not accept formulae*

2 (L6)

(ii) any **one** from

*do not accept 'air' for oxygen*

- the oxygen had mass
- oxygen was added to the magnesium  
*accept 'magnesium has gained an element'*
- the magnesium has reacted with oxygen  
*accept 'magnesium is now part of a compound'*

1 (L6)

(b) oxygen

*accept 'O<sub>2</sub>'*

1 (L5)

(c) zinc oxide

*accept 'ZnO'*

1 (L6)

(d)

	chemical change	physical change
A	✓	
B	✓	
C		✓

*all three ticks are required for the mark*

1 (L6)

[6]

**6.**

- (a) (i) magnesium  
zinc  
iron  
copper

*all four metals must be in the correct order for the mark*

1 (L6)

(ii)

	copper	iron	magnesium	zinc	
copper sulphate				✓	
iron sulphate					
magnesium sulphate				×	×
zinc sulphate					

*award one mark for each correct column*

2 (L7)

- (b) (i) copper nitrate + silver

*the products may be in either order*

2 (L6)

- (ii) copper  
silver  
platinum

1 (L7)

- (c) iron because it is more reactive

*both the metal and the reason are required for the mark  
accept 'iron because copper does not react'*

1 (L7)

[7]

**7.**

- (a) (i) 0.44 g

*the unit is required for the mark*

1 (L5)

- (ii) thermal decomposition ✓

*if more than one box is ticked, award no mark*

1 (L6)

(b) (i) magnesium + oxygen → magnesium oxide  
*accept*  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

1 (L6)

(ii) magnesium **or** the contents have gained oxygen  
*accept* 'gained oxygen'  
*accept* 'the oxygen has mass'  
*do not accept* 'it had gained gas' **or** 'an oxide is formed'  
**or** 'magnesium reacted with the oxygen'

1 (L5)

(iii) any **one** from

- oxidation  
*accept* 'oxidisation' **or** 'redox'
- combustion  
*accept* 'burning'

1 (L6)

[5]

8.

(a) any **one** from

- more air **or** oxygen  
*accept* 'gas reaching the flame'  
*already has air or oxygen mixed in it'*
- better mixing gives more combustion **or** more efficient burning  
*accept* 'better **or** faster combustion'  
*accept the converse i.e. arguments applied to a Bunsen with a closed air-hole*

1 (L6)

(b) oxygen  
*do not accept* 'air'

1 (L6)

carbon dioxide + water  
**both** products are required for the mark  
products may be in either order  
*accept* 'carbon monoxide + water'  
*disregard any reference to heat or energy*  
*accept correct formulae for words*  
*the equation need not be balanced*

1 (L6)

[3]



9.

(a) (i) alkaline

1 (L5)

(ii) forms a solution with a pH of about 8.5

1 (L5)

it is not poisonous

1 (L5)

*answers may be in either order  
accept 'pH 8.5' or 'alkaline'*

(b)



*both complete names are required for the mark*

1 (L6)

(c) carbon dioxide

*accept 'CO<sub>2</sub>'*

1 (L6)

[5]

10.

(a) oxygen → magnesium oxide

*both parts of the equation are needed*

*do not accept 'air' for oxygen*

1

(b) nitrogen

1

**the following explanations are only applicable to nitrogen: if any other answer is given above a mark cannot be awarded for the second part**

any **one** from

- contains no oxygen

*accept 'the other jars all contain oxygen'*

- nitrogen is unreactive

*accept 'nitrogen does not support burning'*

1

[3]