



# **KS3 Science**

## **Acids and Bases**

### **Mark Scheme**

**Time available: 39 minutes**

**Marks available: 57 marks**

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## Mark schemes

1.

(a) • 7

- orange
- an answer in the range 1–3      *accept '1–3'*
- purple

*for **all four** rows correct, award two marks  
for any **two** or **three** rows correct, award one mark  
answers must be in the correct column and row in the table*

2 (L3)

(b) any **one** from

- they are corrosive
- they burn **or** irritate

*accept 'they can damage your skin or eyes'  
'in case it touches your skin' is insufficient  
'it is harmful **or** poisonous' is insufficient  
'it can kill you' is insufficient  
'wear gloves' is insufficient  
do **not** accept 'it is flammable'*

1 (L4)

(c) (i) • time, in days

*accept 'time'  
accept 'days'  
do **not** accept 'hours' or 'minutes'*

1 (L4)

(ii) it goes down or decreases

*accept 'it becomes acidic'  
'it goes red' is insufficient  
accept 'it goes from 6.5 to 2.5'  
accept 'the acid gets stronger'  
'it goes sour' is insufficient  
if the label for X is incorrect in part (ci),  
do not penalise again in part (cii)*

1 (L4)

[5]

2.

(a) lemonade

*accept '4.4'*

1 (L5)

- (b) (i) any **one** from
- it is less acidic  
*accept 'it is weaker'*  
*do not accept 'it has become more alkaline'*  
*accept 'it decreases'*
  - its pH has increased  
*accept 'it has gone from 1.0 to 2.5'*  
*do not accept 'it increased'*  
*do not accept 'the acidity changed by pH 1.5'*
- 1 (L5)

- (ii) any **one** from
- ethanoic acid is less acidic than the hydrochloric acid  
*accept the converse*  
*'ethanoic acid is pH 3' is insufficient*  
*accept 'it is less acidic'*  
*'ethanoic acid is weak' is insufficient*
  - ethanoic acid has a higher pH  
*accept 'partially neutralised'*  
*'it is weaker' is insufficient*
  - it has a pH of 3 compared with 1
  - it is a weaker acid
- 1 (L6)

- (c) (i) hydrogen  
*H<sub>2</sub>' or 'H' are insufficient*
- 1 (L6)

- (ii) • sulphur
- 1 (L6)

- oxygen
- 1 (L6)

*S' or O' or O<sub>2</sub>' are insufficient*  
*answers can be in either order*

- (iii) 5
- 1 (L6)

[7]

3.

- (a) (i) • It is neutral ✓  
*if more than one box is ticked, award no mark*
- 1 (L5)

(ii) • any number less than 7 1 (L6)

(iii) any **one** from

- they are alkaline **or** an alkali  
*accept 'a soluble base'*  
*accept 'it has a pH above 7'*  
*specific pH values such as 'its pH is 8.5' are insufficient*

• they react with the acid 1 (L5)

(b) •   
*accept 'copper sulfate'*  
*accept 'the sulphate' for 'copper sulphate'*

•   
*accept 'acid' for 'citric acid'*

•  •   
*accept 'tablet' for 'indigestion tablet'*  
*if **all four** answers are correct, award three marks*  
*if **two or three** answers are correct, award two marks*  
*if **one** answer is correct, award one mark*

3 (L5)

[6]

4.

(a) (i) filtration ✓  
*if more than one box is ticked, award no mark*

1 (L3)

(ii) chromatography ✓  
*if more than one box is ticked, award no mark*

1 (L3)

(b) (i) it is alkaline  
*accept 'alkali'*

1 (L3)

(ii) red 1 (L3)

(c) indicator ✓  
*if more than one box is ticked, award no mark*

1 (L4)

**5.**

(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]

6.

- (a) (i) any **one** from
- lemonade
  - fruit juice  
*accept 'fruit or juice'*
- 1 (L3)

- (ii) any **one** from
- milk
  - water
- 1 (L3)

- (b) (i) any **one** from
- blue
  - dark blue
  - purple
- 1 (L3)

- (ii) any **one** from
- it bubbled  
*accept 'it fizzed'*
  - bubbles were formed  
*accept 'bubbles'*  
*accept 'effervescence'*
- 1 (L3)

- (c) neutralisation ✓  
*if more than one box is ticked, award no mark*
- 1 (L4)

[5]

7.

- (a) (i) 7  
*do **not** accept 'neutral'*
- 1 (L3)

- (ii) it was neutral ✓  
*if more than one box is ticked, award no mark*  
*consequential marking applies*  
*accept 'it was acidic' if the answer to part (i) was less than 7*  
*accept 'it was alkaline' if the answer to part (i) was greater than 7 and up to 14*
- 1 (L4)

- (b) any **one** from
- it decreased **or** went down  
*accept 'it dropped to 5'*
  - it became acidic **or** more acidic
- 1 (L3)

- (c) an alkali ✓  
*if more than one box is ticked, award no mark*
- 1 (L4)

[4]

8.

- (a) calcium chloride  
*do **not** accept the formula*
- 1 (L6)

- (b) (i) any **one** from
- a gas **or** carbon dioxide **or** CO<sub>2</sub> was given off
  - water **or** H<sub>2</sub>O was formed and drained away **or** evaporated  
*accept 'the chemicals formed are washed away'*  
*accept 'calcium chloride is more soluble than calcium carbonate'*  
*do **not** accept 'chemical weathering'*
- 1 (L7)
- (ii) any **one** from
- the soils at B and C contain no acid **or** are not acidic
  - soil B is neutral and soil C is alkaline
  - the pH is higher **or** too high
- 1 (L6)
- (iii) acid rain  
*accept a recognisable method of lowering the pH of the soil*
- 1 (L7)
- (c) (i) any value greater than 960 but smaller than 984
- 1 (L7)
- (ii) any **one** from
- cannot control the environmental variables involved
  - pH of soil may vary
  - cannot predict rainfall during this time
  - cannot predict temperature during this time  
*accept 'data in the table could be unreliable'*
- 1 (L7)

[6]

9.

(a)

Liquid added to the cabbage water	Colour of the cabbage water	Is the liquid acidic, alkaline or neutral?
water	purple	neutral
lemon juice	red	acidic
washing up liquid	blue	alkaline

3 (L4)



(b) indicators

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

1 (L3)

[4]

10.

(a)

substance	acidic	neutral	alkaline
orange juice	* ✓		
egg white			* ✓
oven cleaner			* ✓
milk	* ✓		

*if more than one box is ticked in any row*

*award no mark for that row*

*do **not** accept a tick in 'neutral'*

4

(b) oven cleaner

1

(c) pH7

1

[6]