AQA Chemistry GCSE

Required Practical 7 - Identifying Ions
Mark Scheme

Answers

Q1.Damp litmus paper turns white

Q2.Iron (III)

Q3.

(a) (i) *incorrect test or no test = **0** mark*

*testing the solution **or** using blue litmus = **0** mark*

(test ammonia / gas with red) litmus

accept any acid-base indicator with correct result

1

(goes) blue

OR

(conc.) HCl (1)

white fumes / smoke / solid (1)

allow white gas / vapour

OR

(test ammonia / gas with) Universal Indicator (1)

blue / purple (1)

1

(ii) *incorrect test or no test = **0** marks*

add barium chloride / $BaCl_2$ (solution)

*do **not** accept H_2SO_4 added*

or add barium nitrate / $Ba(NO_3)_2$ (solution)

allow Ba^{2+} solution / aqueous added

1

white precipitate / solid (formed)

allow white barium sulfate / $BaSO_4$

ignore barium sulfate / $BaSO_4$ alone

1

A gas / carbon dioxide is produced.

allow because the air in the tube expands

1

any **one** from:

- Potassium carbonate does not decompose to produce carbon dioxide / a gas.
- Potassium carbonate does not decompose at the temperature of the Bunsen burner **or** the Bunsen burner is not hot enough to decompose potassium carbonate.
- When potassium carbonate decomposes a gas is not formed.

1

Q4.

.(a) (i) so there are no impurities

accept no other chemicals / not contaminated

allow to get the correct result

1

(ii) high melting point

1

unreactive

1

(iii) yellow-orange

1

(b) (i) bubbles / fizz / effervescence

ignore any named gas

1

(ii) milky

1

(c) fast(er)

1

small(er) amount

1

[8]

Q5.

(a) (i) yellow

1

(ii) lilac

1

(b) (bubble through) limewater

1

cloudy

allow white / milky

1

(c) (i) silver nitrate solution

1

(ii) white

1

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Q6.

(a) (i) milky

1

carbonate ions

1

(ii) red

1

(b) (i) smaller

1

(ii) The answer obtained is closer to the true value

1

[5]

Q7.

(a) (i) carbon dioxide / CO_2

1

carbonate / CO_3^{2-}

answers must be in the order shown

marks are independent

1

(ii) ammonia / NH_3

1

litmus

answers must be in the order shown

marks are independent

1

(b) (i) solution is blue

accept blue precipitate only if sodium hydroxide added

allow blue liquid

allow copper sulfate / copper ions are blue

1

(ii) barium chloride / $BaCl_2$

allow barium nitrate / barium ions / Ba^{2+}

1

white

answers must be in the order shown

marks are independent

1

[7]

Q8.

limewater **or** calcium hydroxide solution

1

(reacts with carbon dioxide and) turns cloudy / milky

linked to first point

*if no other mark awarded 'puts out lighted splint' gains **1** mark*

1

Q9

.(a) (i) *method of introducing sample into flame*

e.g. wire / splint / spray

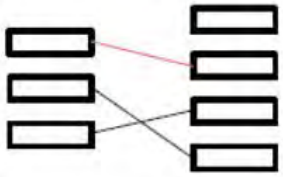
1

clean wire or colourless flame

allow blue / roaring flame

1

(ii)



1

1

(iii) (potassium) chloride

*allow KCl **or** Cl^-*

1

(b) (i) copper

allow Cu^{2+}

1

(ii) sulfate

Q10.

(a) (acidified) barium chloride / nitrate

*incorrect reagent **or** no reagent = **0** marks*

*do **not** accept acidified with sulfuric*

acid (still allow result mark if correct)

*allow solution of barium ions / salt **not** barium solution*

*do **not** accept barium hydroxide*

1

(white) precipitate / solid

*do **not** accept incorrect colour for precipitate*

allow barium sulfate (formed)

ignore 'it goes white / cloudy'

1

(b) (white) precipitate / solid

allow aluminium hydroxide (formed)

*do **not** allow incorrect colour for precipitate*

1

(precipitate) dissolves (in excess)

allow sodium aluminate (formed)

allow goes clear / colourless

if incorrect colour precipitate then allow dissolves (in excess)

1

(c) any **two** from:

apply list principle

- yellow = sodium (alum)

  *allow orange **or** yellow orange*

- lilac = potassium (alum)

  allow purple

- colourless = ammonium (alum)

  *if no colours given, allow 'different coloured flames' for **1** mark*

2

[6]

Q11.

Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks
No relevant content

Level 1 (1 – 2 marks)
Any description of a method used and / or a result given

Level 2 (3 – 4 marks)
Description of workable methods used, with results to identify positive **or** negative ions

Level 3 (5 – 6 marks)
Description of methods used to identify both positive **and** negative ions, with relevant results

examples of the points made in the response

extra information

Test: add (platinum / nichrome) wire (for the flame test)

accept any method of introducing the solution into the flame, eg a splint soaked in the solution or sprayed from a bottle

Result: the sodium compounds result in a yellow / orange / gold flame **or** the potassium compound results in a lilac / purple / mauve flame

student could state that potassium carbonate gives a different colour to the three sodium compounds as long as it is clear that the flame test colour comes from Na^+ or K^+

Test: add dilute nitric acid to all four solutions

allow any acid

Result: sodium carbonate and potassium carbonate will effervesce **or** sodium chloride and sodium iodide will not effervesce

Test: add dilute nitric acid followed by silver nitrate

Result: sodium chloride and sodium iodide produce a precipitate **or** sodium chloride produces a white precipitate and sodium iodide produces a yellow precipitate

accept sodium carbonate and potassium carbonate do not produce a precipitate

[6]

Q12

(a) (i) Na_2CO_3: HCl → gas / effervescence / bubbles (1) CO_2 / carbon dioxide / turns lime water milky (1)

1

NaCl: $AgNO_3$ → white ppt (1) silver chloride (1)

1

$NaNO_3$: Al + NaOH → pungent / sharp smell / choking gas (1) NH_3 / ammonia / turns (red) litmus blue(1)

1

Na_2SO_4: $BaCl_2$ → white ppt (1) barium sulfate (1)

1

*each correct test and one result = **1** mark*

***one** other result for any test = **1** mark this mark can only be awarded <u>once</u>*

(ii) all would give a yellow / yellow-orange (flame) / same coloured (flame) / same results

allow orange (flame) 1

or

they all contain sodium

1

(b) any **two** from:

ignore cost/errors

- fast / quick or comment about speed

  allow precise

- small amounts/sensitive

  allow can be left to run/continuous analysis

- accurate

- ease of automation

  accept operators do not need chemical skills

- sample not used up
- reliable / efficient

2

[7]