

MARK SCHEME

GCSE

CHEMISTRY

AQA - TRIPLE SCIENCE

C8 - TEST 6

CHEMICAL ANALYSIS

Advanced

Mark schemes

1.

- (a) (i) *each correct test and one result = 1 mark*
one other result for any test = 1 mark
this mark can only be awarded once

1

Na_2CO_3 : HCl → (odourless) gas (1)
CO₂ / carbon dioxide (1)

1

NaCl: AgNO₃ → white ppt (1)
silver chloride (1)

1

NaNO₃: Al + NaOH → pungent /sharp smell / choking gas (1)
NH₃ / ammonia (1)

1

Na₂SO₄: BaCl₂ → white ppt (1)
barium sulphate (1)

1

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

or

they all contain sodium owtte

1

- (b) any **two** from:

ignore cost

- fast / quick or comment about speed
ignore human error
- small amounts
accept any valid answer
- sensitive / accurate
accept operators do not need chemical skills
- ease of automation
- sample not used up
- reliable / efficient
- can be left to run / continuous analysis
ignore results can be saved

2

- 2.** (a) any **two** from:
ignore reference to taste / shelf-life / sales etc
- improve the colour / appearance
 - additives are permitted / not banned / listed on the label
 - link between additives and hyperactivity not proved
 - maintain the low cost of the drink **or** natural colours would make the drink cost more
allow cheaper if qualified
- 2
- (b) have a control group / placebo **or** test children before any drink given
 1
- give a drink to at least 3 groups **or** give a drink at least 3 times
 1
- give each additive to different group / children / at different times
 1
- observe / monitor / compare behaviour of group / children
 1
- (c) (i) so that there would be trust / respect / no bias
 1
- (ii) compare the colours / spots from the orange drink with those of the (three) additives
accept diagram of chromatogram(s) with spots for E102, 104, 110 and sample from the orange drink
 1
- there should be no matching colours / spots
 1
- [9]**
- 3.** (a) (i) test: limewater
accept calcium hydroxide solution
 1
- result: 'goes' cloudy
*accept white **or** milky*
*do **not** accept misty **or** chalky test must be correct before result mark can be considered*
 1

(ii) $2 \text{NaHCO}_3 + \text{H}_2\text{SO}_4 \rightarrow$
 $\text{Na}_2\text{SO}_4 + (2) \text{H}_2\text{O} + (2) \text{CO}_2$ 1
correctly balanced 1

(b) (i) $\text{H}^+ + \text{OH}^-$ 1
 $\rightarrow \text{H}_2\text{O}$
deduct **one** mark if incorrectly balanced
accept H_3O^+ instead of H^+ then $2\text{H}_2\text{O}$ needed for balance 1

(ii) pH increases
accept numerical indication 1

(c) addition of sulphuric acid 1

correct use of an indicator
accept idea of forming a neutral solution 1

crystallisation (of neutral solution)
accept description using evaporation 1

[10]

4. (a) (i) ionic (bonding) 1

(ii) ions cannot move in solid **or** are in fixed positions
*do **not** accept electrons / atoms / molecules*
ignore particles
***must** mention ions* 1

but can move in solution 1

(b) silver chloride formed 1

which is insoluble 1

(c) (i) aluminium 1

calcium

accept other metal ions that also give white precipitates (such as lead and zinc)

1

(ii) add excess sodium hydroxide solution

the second mark of each pair is dependent on the first mark being awarded.

1

precipitate remains

1

carry out a flame test

1

not red / orange

accept any colour that is not orange / red

give full credit for answers that correctly eliminate other cations in (c)(i) that would give white precipitates with a few drops of NaOH

1

[11]

5.

(a) water level above the start line

and

start line drawn in ink

allow water level too high

1

water level

food colours would dissolve into water

or

start line

the ink would 'run' on the paper

1

(b) (distance moved by **A**) 2.8cm **and** 8.2 cm (distance moved by solvent)

allow values in range 2.7 – 2.9 cm and 8.1 – 8.3 cm

1

$\frac{2.8}{8.2}$

1

0.34

allow 0.33 or 0.35

allow ecf from incorrect measurement to final answer for 2 marks if given to 2 significant figures

accept 0.34 without working shown for 3 marks

1

(c) 6.6 cm

allow values between 6.48 and 6.64 cm

1

(d) solvent moves through paper

1

different dyes have different solubilities in solvent

1

and different attractions for the paper

1

and so are carried different distances

1

(e) calcium ions

allow Ca^{2+}

1

sodium ions

allow Na^+

1

(f) two different colours

or

Ca^{2+} / one is orange-red and Na^+ / the other is yellow

allow brick red for Ca^{2+} and / or orange for Na^+

allow incorrect colours if consistent with answer to 7.5

1

(so) colours mix

or

(so) one colour masks the other

1

(g) (Student **A** was incorrect)

because sodium compounds are white not green

or

because sodium carbonate is soluble

1

so can't contain sodium ions

1

(Student **B** was incorrect)

because adding acid to carbonate produces carbon dioxide

1

so must contain carbonate not chloride ions

1

[18]