

# MARK SCHEME

# GCSE

## CHEMISTRY

## AQA - TRIPLE SCIENCE

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C8 - TEST 3

CHEMICAL ANALYSIS

Intermediate

## Mark schemes

1.

(a) (improve) appearance

*allow add colour*

*allow these food colourings have not been proven to cause hyperactive behaviour in young children*

*do **not** accept taste / flavour / preservatives*

*ignore reference to E-numbers*

1

(b) X

1

(c) any **three** from:

- S contains six / 6 colourings

- P contains five / 5 colourings

*if neither of first 2 bullet points given allow 1 mark for S contains more colours than P **or** converse*

- both S and P contain the same

five / 5 colourings

- both contain W **and** Y

- both sweets (may) cause hyperactivity

*ignore unsafe*

- neither contain X **and** Z

3

[5]

2.

(a) check if safe to eat / healthy

**or**

permitted

*accept references to allergies / medical problems*

1

- (b) any **three** from:  
*accept dye for colour*
- made up of two colours / dots
  - contains an unknown colour / dot
  - contains a harmful colour
  - contains E104 / quinoline yellow  
**or** does not contain E133 / brilliant blue
  - further analysis needed
- 3

- (c) ignore No or Yes but No must be implied  
 there could be other additives (in the sweets)  
*accept any other type of additives but **not** colourings*
- 1
- could still contain / use / add natural colours  
*accept non-artificial for natural*  
**or**  
*named natural colours*
- 1

[6]

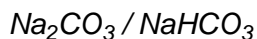
3.

- (a) oxygen/O<sub>2</sub>  
*for 1 mark*
- 1
- (b) water/H<sub>2</sub>O  
*for 1 mark*
- 1
- (c) carbon dioxide/CO<sub>2</sub>  
 (if symbols are used they must be correct)  
*for 1 mark*
- 1
- (d) gives out  
*for 1 mark*
- 1
- heat or energy (2 independent marks)  
*for 1 mark*
- 1

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4.

- (a) sodium carbonate / sodium hydrogencarbonate / sodium bicarbonate



*ie*

*sodium / sodium ions (1 mark)*

*carbonate / carbonate ions*

*(1 mark)*

*incorrect formula including Na and*

*CO<sub>3</sub> = 1 mark*

2

- (b) calcium chloride



*ie calcium / calcium ions (1 mark) chloride / chloride ions (1 mark)*

*incorrect formula including Ca and Cl = 1 mark*

2

- (c) iron or iron(II) ions

*Fe<sup>2+</sup> ferrous ions*

*ignore anions*

*ignore nickel / chromium*

*do not accept iron(III) or ferric ions*

1

[5]

5.

- (a) limewater / calcium hydroxide

1

(limewater) goes milky / cloudy

*do not allow this mark if lime water added to solution or powder*

**or**

gives white precipitate / solid

1

- (b) eg flame colour of (Na) and flame colour of (K) interfere / mask / mix with each other

*accept difficult to determine the colour*

**or**

*hard to distinguish*

*accept some indication that two distinct colours are not seen*

1

- (c) (i) barium chloride (solution) / BaCl<sub>2</sub>

*ignore mention of acidification but*

*do not allow sulfuric acid.*

*wrong reagent = no mark*

1

white precipitate / white solid  
*allow white barium sulfate*  
**or**  
*barium sulfate precipitate*

1

(ii) white precipitate / white solid  
*ignore goes milky*  
*do **not** accept any mention of precipitate dissolving*

1

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6.

(a) yellow

*allow orange*  
*allow orange-yellow*

1

(b) copper (ion)

*allow Cu<sup>2+</sup>*  
*allow copper (II)*  
*allow barium (ion)*  
*allow Ba<sup>2+</sup>*

1

(c) (flame) colours are masked

*allow (flame) colours mix / blend*  
*allow only see one colour*  
*allow cannot see two colours at once*  
*ignore hard to distinguish*

1

(d) Li<sup>+</sup>

1

Na<sup>+</sup>

1

(e) bromide (ion)

*allow Br<sup>-</sup>*  
*ignore bromine*

1

- (f) add barium chloride (solution)  
*allow barium nitrate (solution)* 1
- add hydrochloric acid  
*allow nitric acid*  
*allow acidified*  
*do **not** accept sulfuric acid* 1
- white precipitate produced  
*dependent on use of a barium compound* 1

[9]

7.

- (a) filtration  
**or**  
 by passing through filter beds to remove solids 1
- sterilisation to kill microbes  
*allow chlorine / ozone allow ultraviolet light* 1
- (b) water needs more / different processes 1
- because it contains any **two** from:
- more organic matter
  - more microbes
  - toxic chemicals or detergents
- 2
- (c) *(as part of glassware attached to bung)*  
 salt solution in (conical) flask  
*allow suitable alternative equipment, eg boiling tube* 1
- (at end of delivery tube)*  
 pure water in test tube which must not be sealed  
*allow suitable alternative equipment, eg, beaker, condenser* 1
- heat source (to heat container holding salt solution) 1
- if no other mark obtained allow for 1 mark suitable equipment drawn as part of glassware attached to bung **and** at end of delivery tube*
- (d) determine boiling point 1

should be at a fixed temperature 100°C

*allow should be 100°C*

*allow if impure will boil at a temperature over 100°C*

1

(e) high energy requirement

1

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8.

(a) start line drawn in ink

1

so it will run / dissolve in the solvent / split up

*allow mixes with the spots*

1

spots under solvent **or** solvent above spots / start line

1

so they will mix with solvent **or** wash off paper **or** colour the solvent **or** dissolve in the solvent

1

(b) (i) contains **A** and **E**

1

and one other (unknown substance)

*if no other marks awarded, an answer saying it is made up of three colours gains 1 mark*

1

(ii) 45 or 46

*allow any value from 45 to 46*

1

18

*allow any value from 16 to 20*

*award 1 mark if numbers correct but in cm*

1

(iii) 0.40

*allow ecf from (b)(ii)*

*ignore units*

1

(c) fast red

*allow ecf from (b)(iii)*

1

has same  $R_f$  value

*allow none of them, as none has the same  $R_f$  value for 2 marks*

1

(d) any **one** from:

- more accurate
- more sensitive
- uses small quantities of samples
- quicker / faster / more rapid
- can link to mass spectrometer (MS)

1

[12]

9.

(a) kills bacteria / sterilises (water)

*allow kills microorganisms / microbes / germs*

*allow 'makes (water) safe (to drink)' or disinfectant*

*ignore cleans water or removes impurities / bacteria*

1

(b) goes colourless / decolourised (from red / red-brown / brown / yellow / orange)

*allow colour disappears*

*ignore 'goes clear' or discoloured*

*do not accept incorrect initial colour*

*do not accept precipitate*

1

(c) (i)  $\text{Br}_2$  and  $2\text{Cl}^-$

*allow multiples / fractions if whole equation balanced*

1

(ii) changes to red / red-brown / brown / yellow / orange

*do not accept effervescence / fizzing / precipitate / gas given off*

*ignore vapour / temperature changes / ignore initial colour*

1

(d) (i) 7 outer electrons or

same number of outer electrons

*allow last / final shell for outer*

*allow energy level / orbit / ring for shell*

*allow 'need to gain 1 e<sup>-</sup> to have a full outer shell'*

*ignore 'similar number of outer electrons'*

1



(ii) bromine / it (atom) is bigger **or**  
*must be a comparison*

outer electrons (level / shell) further from nucleus **or** more shells  
*do **not** accept more outer shells*  
*ignore more electrons*

forces / attractions are weaker **or** more shielding **or** attracts less  
*do **not** accept magnetic / gravitational / intermolecular forces*  
*allow 'electron(s) attracted less easily'*

electron(s) gained less easily  
*"outer / last / final" must be mentioned once, otherwise max 2*  
*marks.*  
*accept converse for chlorine throughout where clearly stated*

3

(e) (i) white precipitate **or** white solid  
*ignore names of chemicals*

1

(ii) cream precipitate **or** cream solid  
*allow pale yellow / off-white precipitate / solid*  
*ignore names of chemicals*

1

[10]