

- M1.(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]

M2.(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]