

# Purity Formulations + Chromatography

## Mark Scheme

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.8 Chemical Analysis
Sub-Topic	Purity Formulations + Chromatography
Difficulty Level	Gold Level
Booklet	Mark Scheme

**Time Allowed:** 30 minutes

**Score:** /28

**Percentage:** /100

**Grade Boundaries:**

- M1.(a)** (medicine is) a mixture **and**  
(designed as) a useful product 1
- (b) sugar / flavouring 1
- to make it taste better  
**or**  
colouring  
to make it look more attractive 1
- (c)  $C_8H_9NO_2$   
*any order of elements* 1
- 151 1
- (d) mass of acetylsalicylic acid = 0.3 g 1
- $$= \frac{0.3}{100} \text{ (mol)}$$
  
*method mark – divide mass by  $M_r$*  1
- $$= 0.00167 \text{ (mol)}$$
  
*allow 0.0016666(66)* 1

$1.67 \times 10^{-3}$  (mol)

*correct answer with or without working scores 4 marks*

*allow ecf from steps 1, 2 and 3*

1

[9]

**M2.(a)** mobile phase / solvent moves through paper

1

and carries substances different distances

1

which depend on their attraction for paper and solvent

*allow which depend on solubility in solvent and attraction to paper*

1

(b) **Level 2 (3–4 marks):**

A relevant and coherent description which provides a clear analysis of the chromatogram. The response makes logical links between the points raised and uses sufficient examples to support these links.

**Level 1 (1–2 marks):**

Simple statements are made which demonstrate a basic attempt to analyse the chromatogram. The response may fail to make logical links between the points raised.

**0 marks:**

No relevant content

**Indicative content**

- black ink is a mixture
- because more than one spot
- contains blue, red and yellow
- because R<sub>f</sub> values / positions match
- does not contain green
- contains an unknown
- which is insoluble
- yellow is most soluble or has highest R<sub>f</sub> value, blue is least

4

- (c) both measurements from artwork for 1 mark ( $1.3 \pm 0.1$  cm and  $5.3 \pm 0.1$  cm)

1

correct equation used for 1 mark

1

$0.25 \pm 0.02$

1

*accept  $0.25 \pm 0.02$  without working shown for 3 marks*  
*allow ecf from incorrect measurement to final answer for 2 marks*

[10]

**M3.(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]