

# MARK SCHEME

# GCSE

## CHEMISTRY

## AQA - COMBINED SCIENCE

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C8 - TEST 5

CHEMICAL ANALYSIS

Advanced

## Mark schemes

1. (a) (boil ethanol) in a water bath 1
- (b) (test) add iodine (solution) 1
- (result) blue-black
- allow black*  
*allow blue / black*  
*allow dark blue*  
*ignore purple unqualified* 1
- (c) solvent moves through paper 1
- different pigments have different solubilities in solvent  
**or**  
different pigments have different attractions for the paper 1
- (and so) are carried different distances 1
- allow references to solvent as the mobile phase and paper as the stationary phase*
- (d) any **one** from:
- $R_f$  values overlap  
**or**  
0.20 is within range for two pigments
  - $R_f$  ranges overlap
  - could be chlorophyll b or xanthophyll
  - there may be other pigments (that are not in table 2)
- 1

(e)  $(R_f \text{ value}) = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$

1

$$0.89 = \frac{\text{distance moved by substance}}{140}$$

or

$$0.98 = \frac{\text{distance moved by substance}}{140}$$

1

(distance moved by substance)  
=  $0.89 \times 140$

or

=  $0.98 \times 140$

1

= 125 / 124.6 or 137 / 137.2

1

(from) 125 / 124.6 (mm to) 137 / 137.2 (mm)

1

*an answer of (from) 125 / 124.6 (mm to) 137 / 137.2 (mm) scores 5 marks*

*calculation using an incorrect distance moved by solvent scores a maximum of 4 marks*

- (f) **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

5-6

**Level 2:** Relevant points (reasons / causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.

3-4

**Level 1:** Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1-2

**No relevant content**

0

## Indicative content

- variation arising from mutations
- mutations occurring randomly
- produce a different protein / pigment / enzyme responsible for pigment production
- produce if more likely to survive
- will pass on favourable genes
- idea of timescale
- if more light captured, faster rate of photosynthesis
- increased photosynthesis causes faster growth
- outcompete neighbouring plants
- different colours of light have different wavelengths
- absorbing wider range of wavelengths means more light is absorbed
- more likely to survive in changing conditions

[18]

2.

(a) 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

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

- same volume / amount of the acids
- concentration of the acids
- temperature
- same surface area / size / mass / amount of calcium carbonate
- same measuring equipment

2

(ii) any **three** from:

- (after about 4 minutes) the sulfuric acid stops reacting **or** nitric acid continues to react  
*accept more CO<sub>2</sub> with nitric acid at any time after 4 minutes*
- (initially) the reaction with sulfuric acid is faster
- (the reaction stops) because calcium sulfate is a solid  
*allow sulfuric acid produces a solid*
- (the reaction continues) because calcium nitrate is soluble / in solution / aqueous  
*allow nitric acid produces an (aqueous) solution*
- because the calcium sulfate prevents the sulfuric acid reacting with the calcium carbonate
- (the rate is faster) because sulfuric acid contains two hydrogens

3

[7]