

M1.(a) s

1

|

*Answers **must** be in the correct order.*

1

(b) A gas was lost from the flask

1

(c) **Level 3 (5–6 marks):**

A coherent method is described with relevant detail, and in correct sequence which demonstrates a broad understanding of the relevant scientific techniques and procedures. The steps in the method are logically ordered. The method would lead to the production of valid results.

**Level 2 (3–4 marks):**

The bulk of the method is described with mostly relevant detail, which demonstrates a reasonable understanding of the relevant scientific techniques and procedures. The method may not be in a completely logical sequence and may be missing some detail.

**Level 1 (1–2 marks):**

Simple statements are made which demonstrate some understanding of some of the relevant scientific techniques and procedures. The response may lack a logical structure and would not lead to the production of valid results.

**0 marks:**

No relevant content.

**Indicative content**

- sulfuric acid in beaker (or similar)
- add copper carbonate one spatula at a time
- until copper carbonate is in excess or until no more effervescence occurs \*
- filter using filter paper and funnel
- filter excess copper carbonate
- pour solution into evaporating basin / dish
- heat using Bunsen burner
- leave to crystallise / leave for water to evaporate / boil off water
- decant solution
- pat dry (using filter paper)
- wear safety spectacles / goggles

\*Students. may choose to use a named indicator until it turns a neutral colour, record the number of spatulas of copper carbonate added then repeat without the indicator.

6

(d) Total mass of reactants = 221.5

1

159.5

221.5

*allow ecf from step 1*

1

72.0 (%)

1

*allow 72.0 with no working shown for 3 marks*

(e) any **one** from:

- Important for sustainable development
- Economic reasons
- Waste products may be pollutants / greenhouse gases

1

[13]

- M2.(a) cotton wool 1
- (b) all points correct 2  
*± ½ small square*
- allow 1 mark if 5 or 6 of the points are correct*
- best fit line 1  
*must not deviate towards anomalous point*
- (c) (mass) 1  
 2.1 (g)  
*allow ecf from drawn best fit line*
- (time) 1  
 100 (s)
- (d) a gas is produced 1
- which escapes from the flask 1
- (e)  $\frac{9.85}{150} = 0.0656$  1

0.07 (g / s)

*allow ecf answer correctly calculated to 2 decimal places*

1

(f) collect the gas in a gas syringe

1

measured the volume of gas

*allow carbon dioxide for gas*

1

*allow for 1 mark*

*collected gas*

**or**

*counted bubbles*

(g) The particles have more energy

1

The particles move faster

1

[14]

M3.(a)	(i)	central block	1
	(ii)	conducts electricity	1
(b)		any <b>two</b> from:	
		• visual pollution	
		• noise pollution	
		• dust pollution	
		• habitat destruction.	2
(c)	(i)	to concentrate the ore / copper carbonate <b>or</b> to remove / separate the rock	1
	(ii)	12 (tonnes) <i>If answer is incorrect allow one mark for (127 + 132) – 247 or 259 - 247</i>	2
	(iii)	any <b>one</b> from:	
		• so no reactant is wasted / left unreacted	
		• so they know how much product they will make	
		• need to record / compensate for the carbon dioxide produced <i>allow so they can work out their carbon footprint.</i>	1

[8]

M4.(a) 1

*must be in this order*

1

very small

*accept negligible, 1 / 2000*

*allow zero*

1

(b) The mass number

1

(c) C

1

(d) (i) 2

1

(ii) 3

1

(e) (i) 28

1

(ii) 42.9

*accept ecf from (e)(i)*

*accept 42 - 43*

1

(f) (i) 0.9

1

(ii) any **one** from:

- accurate
- sensitive
- rapid
- small sample.

1

[10]

M5.(a) (i) an alloy

1

(ii) harder

1

(b) (i) 162.5

*correct answer with or without working gains 2 marks*

*if no answer or incorrect answer then evidence of correct working*

*[56 + (3x35.5)] gains 1 mark*

2

(ii) 34.46

*accept rounding from 34 - 34.5*

*correct answer with or without working gains 2 marks*

*accept ecf from (b)(i) correctly calculated for 2 marks*

*if no answer or incorrect answer then evidence of 56 / 162.5 or 56*

*/ answer to (b)(i) gains*

*1 mark*

2

[6]