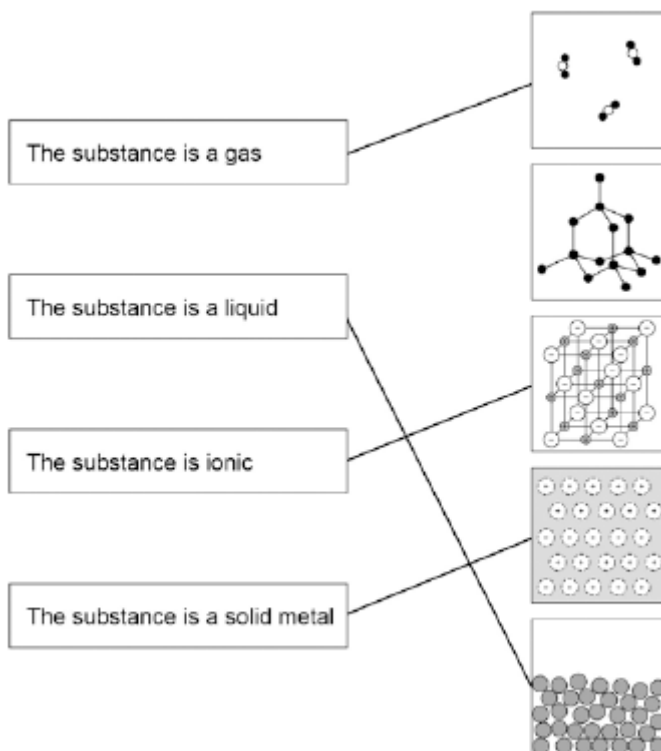


M1.(a)

Statement

Structure



more than one line drawn from a variable negates the mark

4

(b) Carbon

1

(c) It has delocalised electrons

1

(d) the atoms / particles / ions are different sizes  
*do not accept molecules*

1

so there are no rows / layers to slide  
*accept the layers are disrupted*

1

(e)  $\frac{2}{27} \times 100$

1

7.4%

1

*allow 7.4% with no working shown for 2 marks*

(f) Mixture

1

[11]

M2.(a) s

1

l

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]

M3.(a) 50

1

(b) 5%

1

(c) any **two** from:

- cost (9 carat is cheaper)
- pure gold is soft
- **or**  
24 carat gold is soft
- **or**  
9 carat gold is harder  
*allow 9 carat gold is stronger*  
*allow gold is an alloy in 9 carat gold*
- can change the colour

2

[4]

M4.(a) (i) C

1

(ii) B

1

(iii) A

1

(iv) D

1

(b) (i) SO<sub>2</sub>

1

(ii) shared

1

(iii) covalent

1

[7]

M5.(a) sodium loses (electron)

*sharing / covalent / metallic = max 2*

1

chlorine gains (electron)

1

1 **or** an (electron)

1

(b) (i) Have no overall electric charge

1

(ii) Should iodine be added to salt?

1

reason

any **one** from:

- cannot be done by experiment  
*accept difficult to get / not enough evidence*
- based on opinion / view  
*allow must be done by survey*
- ethical **or** economic issue.

1

(c) (i) nitric (acid)

1

(ii) an alkali

1

(iii) indicator

*accept any named acid base indicator*

1

(d) (i) Crystallisation

1

(ii) fertiliser

*allow to help crops grow*

1

- (iii) any **one** from:
- pressure  
*allow concentration*
  - temperature  
*ignore heat*
  - catalyst.

1  
[12]