GCSE Chemistry B (Twenty First Century Science)

J258/02 Depth in chemistry (Foundation Tier)

Question Set 14

1 Malachite is an ore of copper that contains copper carbonate, $CuCO_3$. It is mined on a large scale all over the world.

The flowchart in **Fig. 3.1** shows how copper can be made from copper carbonate, either in industry, or on a small scale in the laboratory.

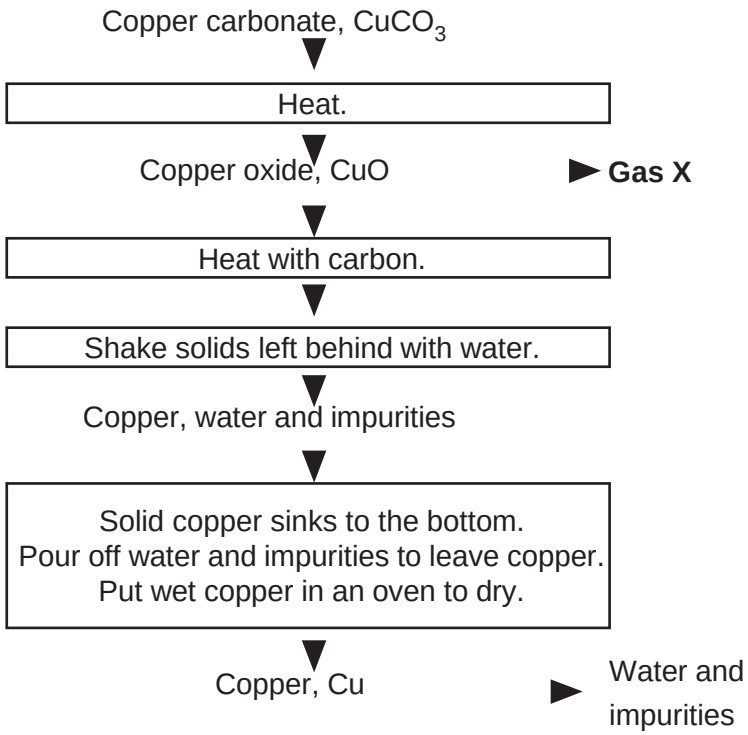


Fig. 3.1

(a) **Gas X** forms when copper carbonate is heated.

What is the name of **gas X**?

Put a ring around the correct answer.

carbon **dioxide** **chlorine** **hydrogen** **nitrogen** **[1]**

(b) Which substances in **Fig. 3.1** are **raw materials**, which are **products** and which are **waste**?

Tick (✓) **one** box in each row.

Substance	Raw Material	Product	Waste
copper carbonate			
gas X			
carbon			
water and impurities			
copper			

[2]

(c) Jane uses the flowchart in **Fig. 3.1** as a method to make copper in the laboratory.

Jane's teacher gives her **Fig. 3.2** to help her predict the theoretical yield of copper.

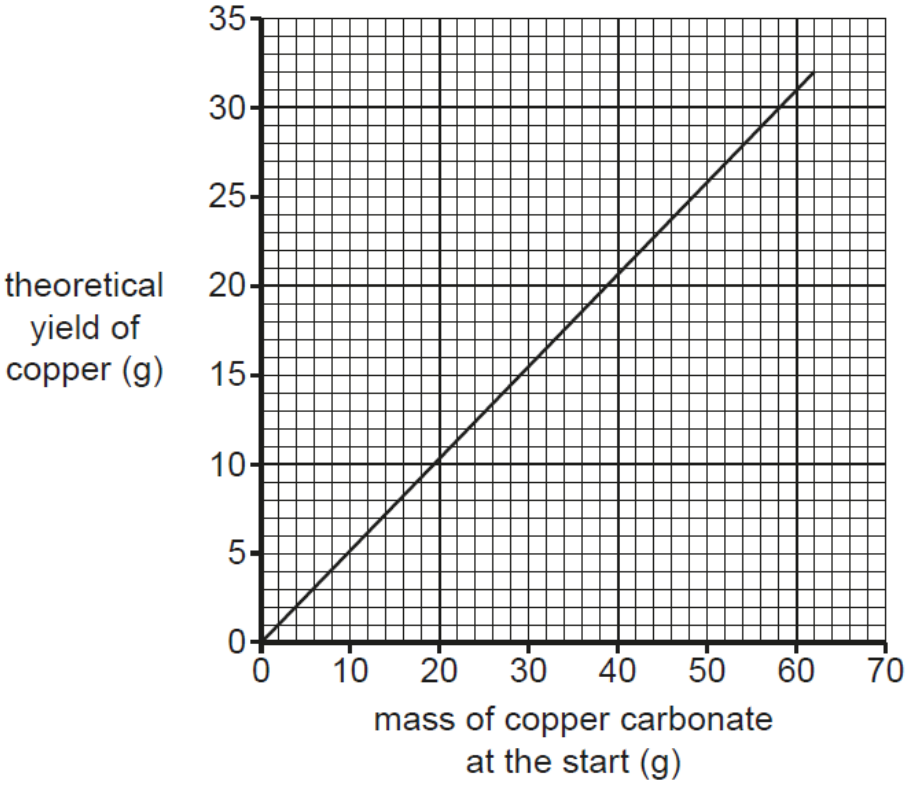


Fig. 3.2

(i) Jane looks at **Fig. 3.2** and thinks that the theoretical yield of copper is directly proportional to the mass of copper carbonate at the start.

Use values from the graph in **Fig. 3.2** to explain why Jane is right. **[2]**

(ii) Explain why the line on the graph in **Fig. 3.2** starts at 0 on both axes. **[1]**

(iii) Jane wants to make a theoretical yield of 15.0 g of copper.

What starting mass of copper carbonate should she use?

Use the graph in **Fig. 3.2** to help you.

Mass of copper carbonate = ... g **[1]**

(iv) Jane does the experiment. She measures the mass of copper she makes (her actual yield).

The mass of copper she makes is higher than she predicts. She knows that she has made mistakes.

Which two mistakes could lead to an incorrectly high yield?

Tick (✓) **two** boxes.

- She did not use enough copper carbonate. ☐
- She did not dry the copper at the end. ☐
- She did not heat the copper oxide for long enough. ☐
- Her copper contains solid impurities. ☐

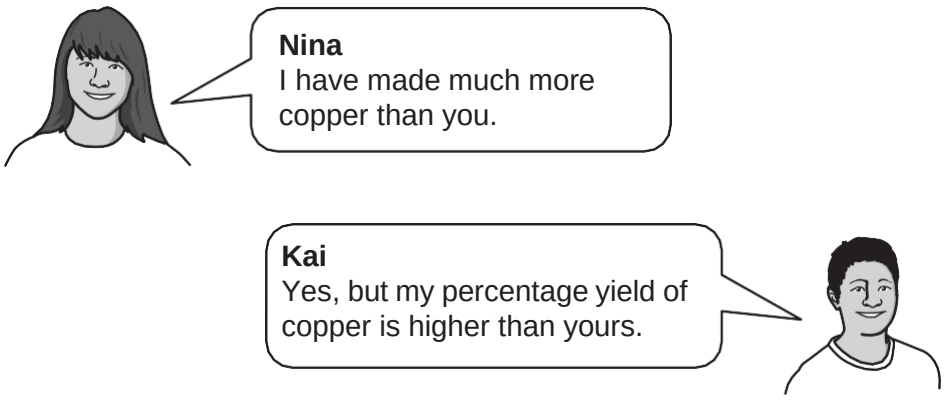
[2]

(d) Nina and Kai also follow the flowchart in **Fig. 3.1** to make some copper.

They compare the mass of copper they make at the end (their actual yield) with each other.

Name	Mass of copper carbonate at the start (g)	Theoretical yield ofcopper (g)	Mass of copper made (actual yield)(g)
Nina	50.0	26.0	18.0
Kai	10.0	5.0	4.8

They make statements about their results.



Are Nina and Kai's statements correct?

Use data from the table to explain your answers

[2]

Total Marks for Question Set 14: 11