

Metals

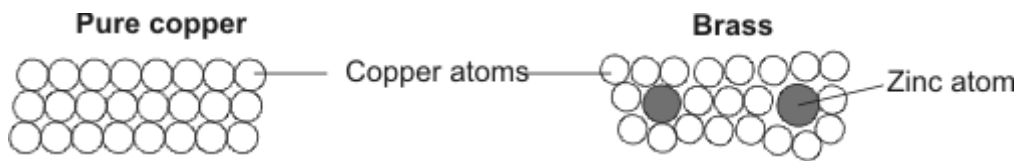
1. Metals and their alloys have many uses.

- (a) Dentists use a smart alloy to make braces that gently push teeth into the right position. What is meant by a *smart alloy*?

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(1)

- (b) Pure copper is made up of layers of copper atoms. Brass is an *alloy* of copper and zinc.

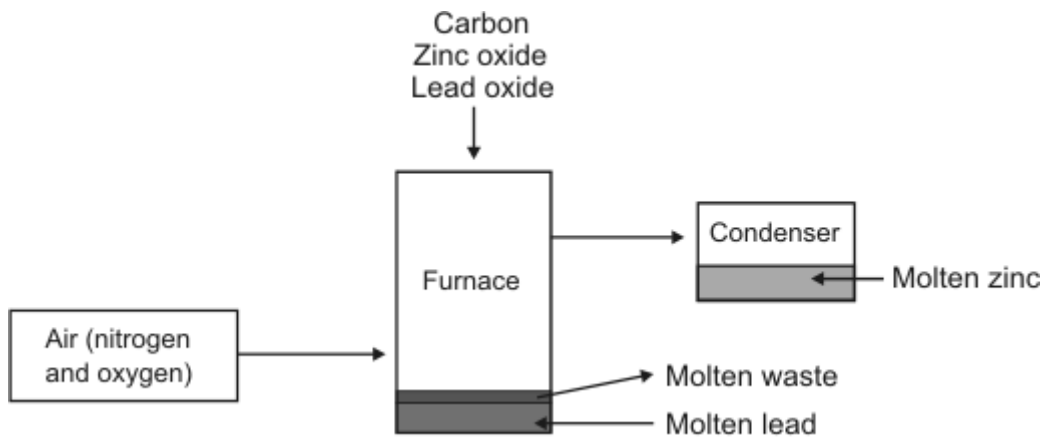


Why are the physical properties of brass different from the physical properties of pure copper?

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(2)

- (c) Nearly all zinc is obtained from ores that also contain lead. The metals zinc and lead can be extracted by reducing their oxides using carbon.



- (i) Choose **one** element from the box below to complete the sentence about the reduction of zinc oxide.

lead nitrogen oxygen

Zinc oxide is reduced by carbon, which takes away.....
 to leave zinc metal.

(1)

- (ii) The melting points and boiling points of lead and zinc are given in the table.

Metal	Lead	Zinc
Melting point in °C	328	420
Boiling point in °C	1740	907

The furnace operates at a temperature of 1200 °C.

Suggest how the lead metal and zinc metal are separated in the furnace.

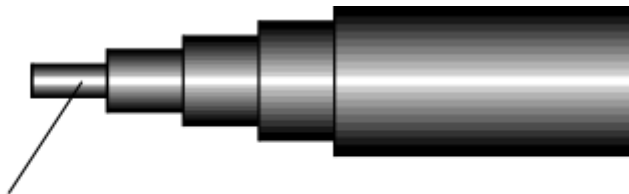
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(2)
(Total 6 marks)

2. The drawing shows a high quality wire used to make electrical connections on a hi-fi system.



Multi-strand "OFC" copper to maintain high signal purity

- (a) Copper is used because it is a very good conductor of electricity. Copper is a typical metal.
- (i) Describe the structure and bonding in a metal. You may wish to draw a diagram to help you to answer this question.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(3)

- (ii) Explain, by reference to your answer to part (a)(i), why copper conducts electricity.

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(1)

Unit C2, C2.2.4

(iii) Explain, by reference to your answer to part (a)(i), why copper can be drawn into wires.

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(1)

(b) The copper used to make this wire is "OFC" copper. This stands for 'oxygen free copper'.

(i) It is thought that when molten copper is cooled and solidified it can take in some oxygen from the air. This may slightly decrease the conductivity of the copper.

Suggest why the conductivity might be decreased.

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(2)

(ii) To make it oxygen free, the copper is heated in an atmosphere of hydrogen.

Explain how this will remove the oxygen.

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(1)

(Total 8 marks)