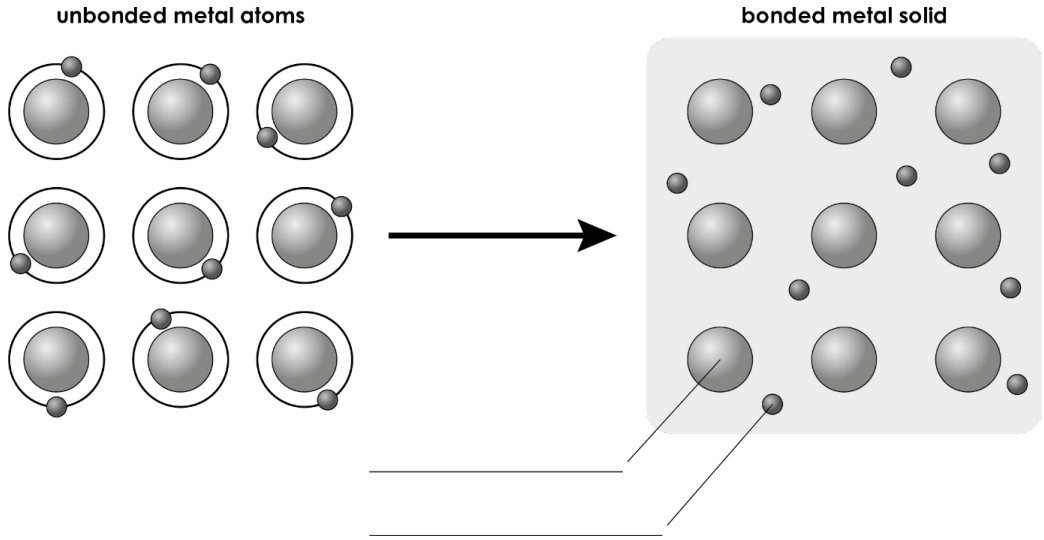
Metallic structure and bonding

1 The diagram shows how metal atoms bond together to form a metal solid.



(a) Label the diagram to show:

i. a metal ion

ii. a delocalised electron.

(2 marks)

(b) Which of these substances has metallic bonding? Circle the correct answer.

A carbon

B copper

C copper sulfate

D oxygen

(1 mark)

(c) State what charge the following particles have in a bonded metal.

i. metal ions

_____ **(1 mark)**

ii. delocalised electrons

_____ **(1 mark)**

(d) Name the force of attraction between the metal ions and the delocalised electrons in a metal.

_____ (1 mark)

(e) Which of these statements is correct? Circle the correct answer.

A Delocalised electrons are free to move through the metal structure.

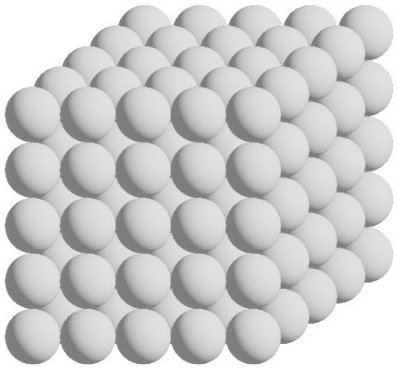
B Delocalised electrons are arranged in a regular pattern.

C Delocalised electrons are positively charged.

D Delocalised electrons are found in the outer shells of atoms.

(1 mark)

(f) The image represents the metal ions in a metal.



Which is the correct name for this type of structure? Circle the correct answer.

A giant covalent structure

B giant metallic structure

C ionic lattice

D simple molecule

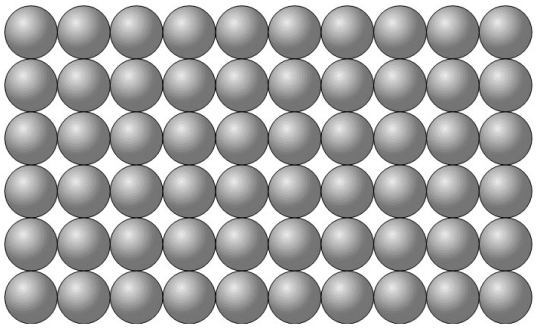
(1 mark)

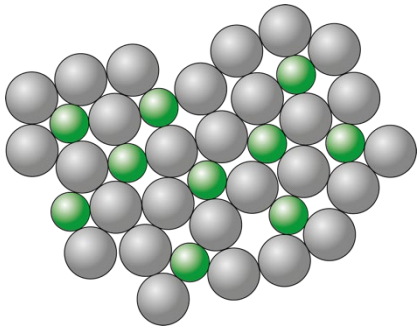
2 Match each of the physical properties of copper to the correct explanation by drawing a line between them.

Physical property	Explanation
High melting point of 1083°C	Delocalised electrons move through the metal and carry the electric charge.
Good electrical conductor	Delocalised electrons move through the metal and transfer heat energy.
Good conductor of heat	Layers of metal ions slide over each other.
Is malleable (can be hammered into shape without breaking)	Large amounts of heat energy are needed to break the strong metallic bonds.

(2 marks)

3 These diagrams represent the particles in a pure metal and in an alloy.





(a) Which of these statements is correct? Circle the correct answer.

A An alloy is a mixture of non-metals.

B An alloy is a mixture of a metal and one or more other element(s).

C An alloy is a compound containing only one metal.

D An alloy is a compound with ionic bonding.

(1 mark)

(b) Describe what will happen when a force is applied horizontally to the:

i. layers of ions in a pure metal

_____

_____

(1 mark)

ii. ions in an alloy

_____

_____

(1 mark)

(c) Use the words below to complete the sentences. You do not have to use all the words.

harder **softer** **regular** **irregular**

more **less** **particles** **soft**

Pure metals are too _____ for many uses. Alloys are _____ than pure metals. An alloy has different sized _____ . This disrupts the _____ arrangement of particles in the metal and stops the layers of particles from rolling over each other.

(4 marks)

[Total: 17 marks]

Which question(s) did you get wrong? Why?

What will you do next time you're asked a similar question?