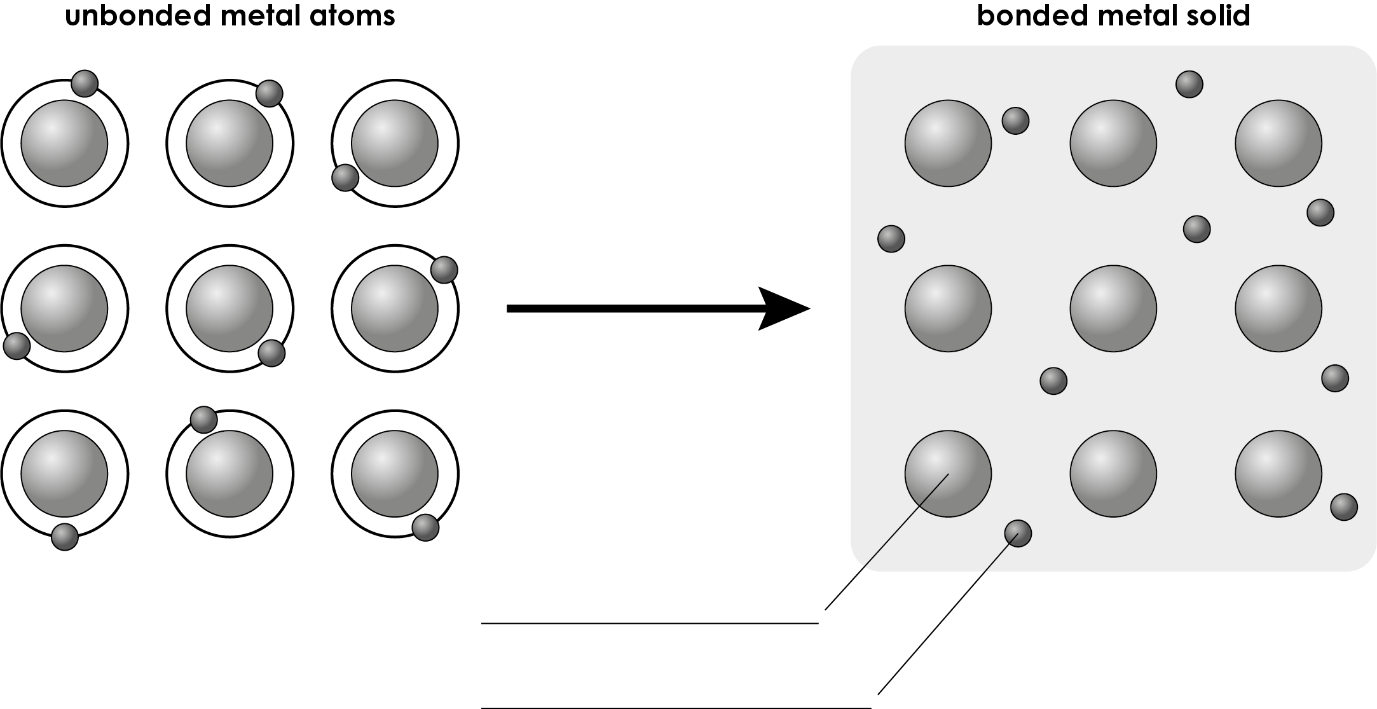
Metallic structure and bonding

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



* 1. Label the diagram to show:

1. a metal ion
2. a delocalised electron.

**(2 marks)**

* 1. Which of these substances has metallic bonding? Circle the correct answer.

**A** carbon

**B** copper

**C** copper sulfate

**D** oxygen

(1 mark)

* 1. State what charge the following particles have in a bonded metal.

1. metal ions

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1 mark)

1. delocalised electrons

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1 mark)

* 1. Name the force of attraction between the metal ions and the delocalised electrons in a metal.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(1 mark)**

* 1. Which of these statements is correct? Circle the correct answer.

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

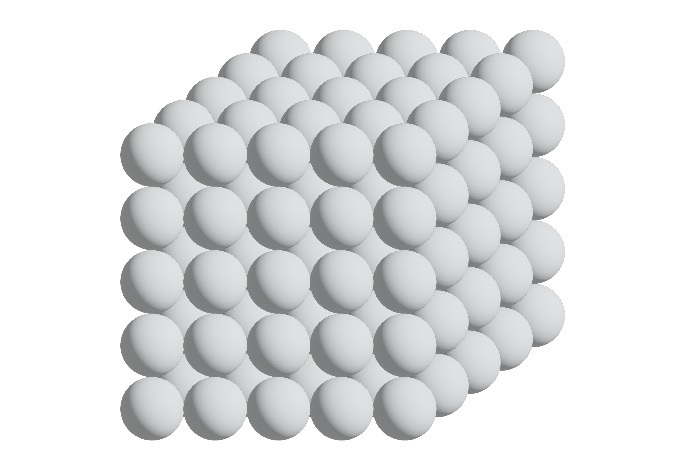
**B** Delocalised electrons are arranged in a regular pattern.

**C** Delocalised electrons are positively charged.

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

(1 mark)

* 1. 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

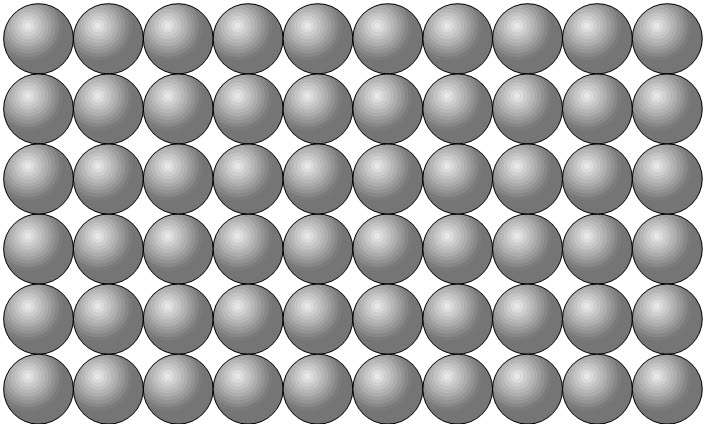
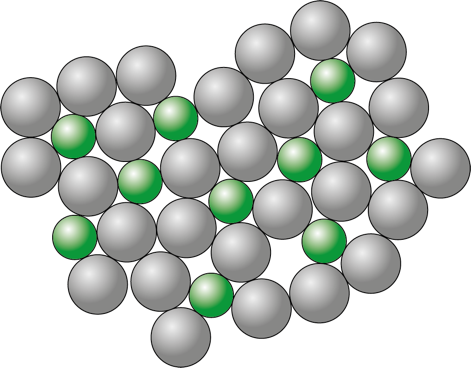
(1 mark)

1. 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)

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

* 1. 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)

* 1. Describe what will happen when a force is applied horizontally to the:

1. layers of ions in a pure metal

(1 mark)

1. ions in an alloy

(1 mark)

* 1. 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?