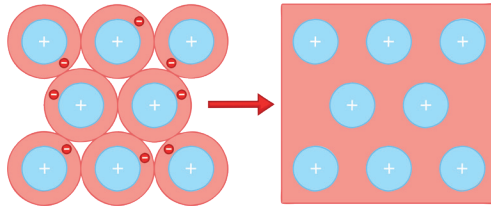


Metallic Bonding

1. Label both pictures with any of the following words:

Keywords: positively-charged, metal atom, electron, negatively-charged, metal ion



2. Complete the following sentences:

Keywords: outer, lattice, negative, electrons, delocalised, positive

The metal ions have a _____ charge.

The electrons have a _____ charge.

The electrons in the _____ shell of the metal atoms are _____ (free).

There is a strong force of attraction between the metal ions and the delocalised _____ because opposite charges attract. This creates a large, regular pattern called a _____.

3. Match up the **properties** of metals and with the **explanation** for them.

Property

high melting and boiling point

can conduct electricity

can conduct thermal energy (heat)

malleable

ductile

Explanation

The layers of metal atoms can slide over one another, and so can be bent, hammered or rolled into various shapes.

The layers of metal atoms can slide over one another, and so can be pulled into wires.

A lot of energy is required to overcome the strong force of attraction (electrostatic force) between the positive metal atoms and sea of negative electrons.

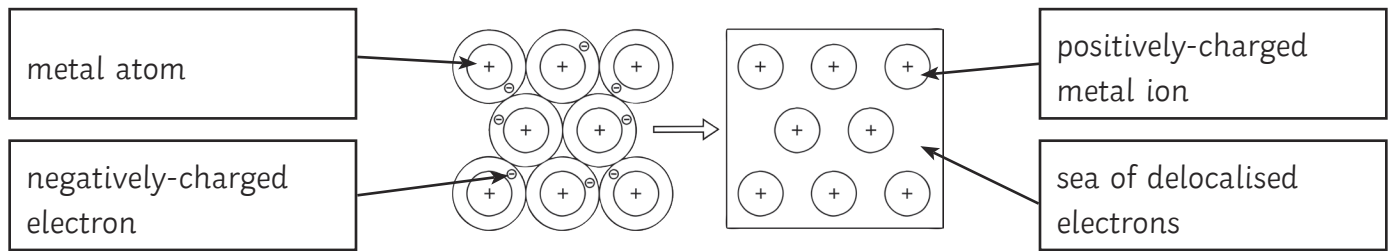
The delocalised electrons gain thermal energy and start to move around the structure, moving the thermal energy (heat) throughout.

The delocalised (free) electrons can carry an electrical charge throughout the metal.

Metallic Bonding Answers

1. Label both pictures with any of the following words:

Keywords: positively charged, metal atom, electron, negatively charged, metal ion



2. Complete the following sentences:

Keywords: outer, lattice, negative, electrons, delocalised, positive, negative

The metal ions have a **positive** charge.

The electrons have a **negative** charge.

The electrons in the **outer** shell of the metal atoms are **delocalised** (free).

There is a strong force of attraction between the metal ions and the delocalised **electrons** because opposite charges attract. This creates a large, regular pattern called a **lattice**.

3. Match up the **properties** of metals and with the **explanation** for them.

Property

Explanation

high melting and boiling point	The layers of metal atoms can slide over one another, and so can be bent, hammered or rolled into various shapes.
can conduct electricity	The layers of metal atoms can slide over one another, and so can be pulled into wires.
can conduct thermal energy (heat)	A lot of energy is required to overcome the strong force of attraction (electrostatic force) between the positive metal atoms and sea of negative electrons.
malleable	The delocalised electrons gain thermal energy and start to move around the structure, moving the thermal energy (heat) throughout.
ductile	The delocalised (free) electrons can carry an electrical charge throughout the metal.