IGCSE CHEMISTRY • EXERCISE SHEET

2.7 Metallic bonding

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS delocalised electrons 离域电子 • malleability 展性 • metallic bonding 金属键 • ion 离子 • metal 金属

Objective

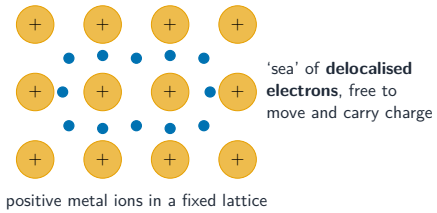
Build the skills to answer exam questions on **metallic bonding** 金属键 — the 'sea' of **delocalised electrons** 离域电子, and how it explains conductivity and **malleability** 展性.

You must be able to:

- describe metallic bonding (positive ions in a sea of delocalised electrons)
- explain why metals conduct electricity
- explain why metals are malleable and ductile

1 Worked examples

The metallic 'sea' of electrons



A metal is positive ions in a sea of delocalised electrons that are free to move

- **metallic bond:** electrostatic attraction between positive ions and the sea of electrons.
- **conducts:** the delocalised electrons are free to move and carry charge.
- **malleable/ductile:** layers of ions can slide without breaking the bond.

2 Practice

2.1 Define metallic bonding. [1]

2.2 State what carries the electric charge in a metal. [1]

3 Exam-style questions

3.1 A metal can be hammered into a sheet because: [1]

A B
C D

A the bonds are weak
B layers of ions can slide over each other
C it contains molecules
D the electrons are fixed

3.2 A piece of copper conducts electricity and can be drawn into a wire.

(a) Explain why copper conducts electricity. [2]

(b) Explain why copper is ductile (can be pulled into a wire). [2]

3.3 State why metals generally have high melting points. [2]