

2 Chemical bonding – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
electrons	电子	_____	_____	_____
bonding	化学键	_____	_____	_____
ions	离子	_____	_____	_____
ionic bond	离子键	_____	_____	_____
lattice	晶格	_____	_____	_____
molten	熔融	_____	_____	_____
covalent bond	共价键	_____	_____	_____
diamond	金刚石	_____	_____	_____
graphite	石墨	_____	_____	_____
metallic bonding	金属键	_____	_____	_____
delocalised electrons	离域电子	_____	_____	_____

Recall

From Part 1 you know atoms have **electrons** 电子 in shells. Atoms join up to fill their outer shell — this is **bonding** 化学键. Here we meet the three types.

- Atoms bond to reach a full outer shell (like a noble gas).
- The type of bond decides the substance's properties.

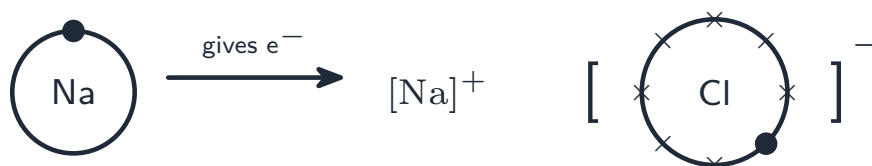
Nothing here is hard — it just compares three bonds.

New ideas

Read these first, then do the Practice.

■ 1 Ionic bonding (metal + non-metal)

A metal atom **gives** electrons to a non-metal atom, making charged **ions** 离子. An **ionic bond** 离子键 is the strong attraction between the opposite charges.



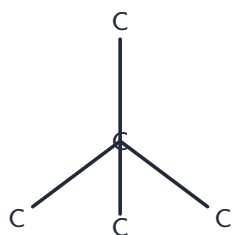
Ionic compounds form a giant **lattice** 晶格. They have **high melting points** and conduct only when **molten** 熔融 or dissolved (the ions can then move).

■ 2 Covalent bonding (non-metal + non-metal)

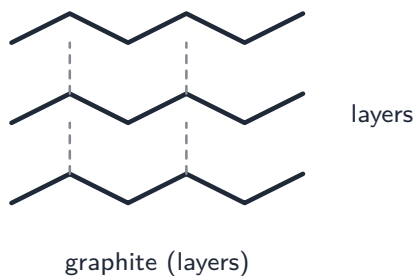
A **covalent bond** 共价键 is a **shared** pair of electrons between two non-metal atoms. Small molecules (like H₂O) have **low** melting points (the forces **between** molecules are weak) and do not conduct.

■ 3 Giant covalent and metallic

- **diamond** 金刚石 — each carbon bonds to **four** others → very hard.
- **graphite** 石墨 — carbon in flat **layers** that slide (a lubricant); spare electrons let it **conduct**.



diamond (network)



graphite (layers)

- **metallic bonding** 金属键 — positive metal ions in a “sea” of **delocalised electrons** 离域电子. This is why metals **conduct** and can be hammered into shape.

Watch out: ionic bonding **transfers** electrons (metal $\rightarrow$ non-metal); covalent bonding **shares** them (non-metal + non-metal) — don’t confuse the two. An ionic solid conducts only when **molten or dissolved**, never as a solid (the ions must be free to move).

Practice

Try these in order.

2.1 What type of elements form (a) an ionic bond, (b) a covalent bond? [2]

2.2 Define an *ionic bond*. [2]

2.3 Why does an ionic compound conduct electricity when molten but not when solid?[2]

2.4 What is a *covalent bond*?

[1]

2.5 Explain why graphite can conduct electricity but diamond cannot.

[2]

2.6 Challenge. Sodium chloride has a high melting point, but methane (a small covalent molecule) has a very low one. Explain this difference.

[2]