2 Types of chemical bonding – Part 1

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)		
chemical bond	化学键			
ionic bond	离子键			
covalent bond	共价键			
metallic bond	金属键			
polar covalent	极性共价			
ionic solid	离子固体			
lattice	晶格			
delocalized	离域			
alloy	合金			

Recall

You already know that atoms join together in different ways:

- A metal and a non-metal form an **ionic** compound by transferring electrons.
- Two non-metals form a **covalent** bond by sharing electrons.
- Metals are shiny and conduct electricity.

This sheet lines up the three kinds of bonding and what they explain. Each idea has a worked example.

New ideas

1 The three types of bond

A **chemical bond** 化学键 holds atoms together. Which type forms depends on the atoms:

sodium gives its outer electron (×) to chlorine

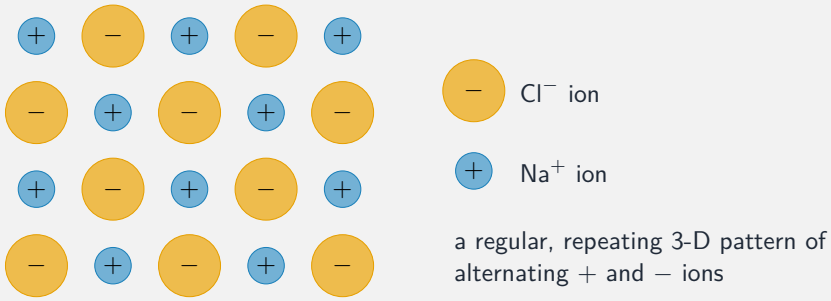
- **ionic bond** 离子键: a metal gives electrons to a non-metal (opposite charges attract).
- **covalent bond** 共价键: two non-metals **share** electrons.
- **metallic bond** 金属键: metal atoms share a ”sea” of loose electrons.

2 Polar covalent bonds

When two atoms share electrons **unequally** (one pulls harder), the bond is a **polar covalent** 极性共价 bond –one end is slightly negative, the other slightly positive.

3 Ionic solids

An **ionic solid** 离子固体 is a giant repeating **lattice** 晶格 of alternating positive and negative ions.

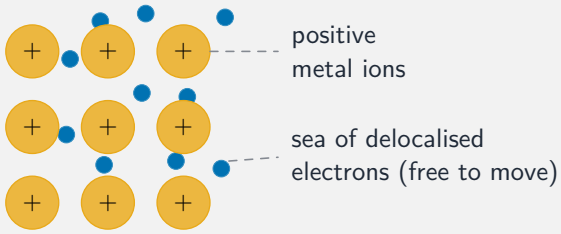


a regular, repeating 3-D pattern of alternating + and − ions

The strong attraction gives high melting points and brittleness.

4 Metals and alloys

In a metal, positive ions sit in a sea of **delocalized** 离域 (free-moving) electrons – which is why metals conduct and bend. An **alloy** 合金 mixes in different-sized atoms, which stops the layers sliding and makes it harder (like steel).



Watch out: an ionic solid does **not** conduct electricity when solid –its ions are locked in place. It conducts only when **molten or dissolved**, where the ions are free to move.

Practice

Try these in order. The methods are all above.

2.1 State the type of bond formed between (a) a metal and a non-metal, (b) two non-metals. [2]

2.2 Explain, in terms of electrons, how a metal conducts electricity. [2]

2.3 State why an ionic solid conducts electricity when molten but not when solid. [2]

2.4 Explain why an alloy is usually harder than the pure metal. [2]

2.5 Sodium and chlorine form sodium chloride. State the type of bond and describe what happens to the electrons. [2]