2 Types of chemical bonding – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
chemical bond			
ionic bond			
covalent bond			
metallic bond			
polar covalent			
ionic solid			
lattice			
delocalized			
alloy			

Recall

You already know that atoms join together in different ways:

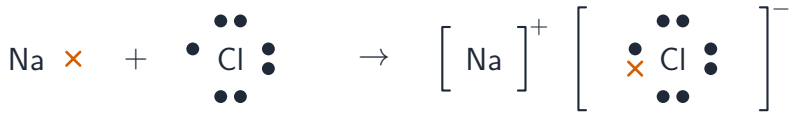
- A metal and a non-metal form an **ionic** compound by transferring electrons.
- Two non-metals form a **covalent** bond by sharing electrons.
- Metals are shiny and conduct electricity.

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** holds atoms together. Which type forms depends on the atoms:



sodium gives its outer electron (×) to chlorine

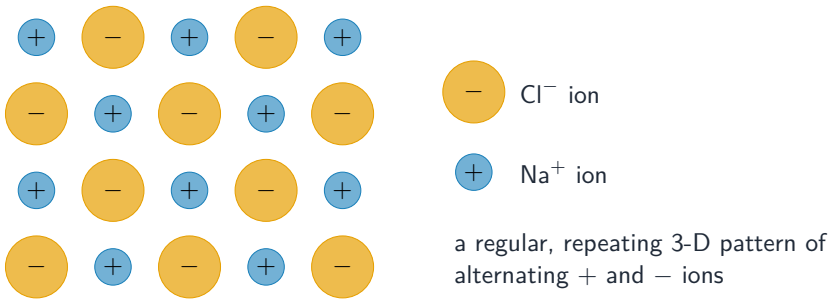
- **ionic bond** : a metal gives electrons to a non-metal (opposite charges attract).
- **covalent bond** : two non-metals **share** electrons.
- **metallic bond** : metal atoms share a "sea" of loose electrons.

2 Polar covalent bonds

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

3 Ionic solids

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

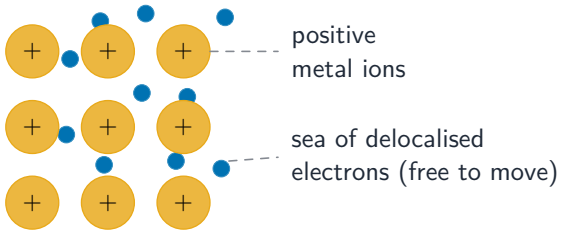


a regular, repeating 3-D pattern of alternating + and − ions

The strong attraction gives high melting points and brittleness.

4 Metals and alloys

In a metal, positive ions sit in a sea of **delocalized** (free-moving) electrons – which is why metals conduct and bend. An **alloy** 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]