

## 2.5 Simple molecules and covalent bonds

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 9 marks

**KEY WORDS** covalent bond 共价键 • intermolecular forces 分子间作用力 • ion 离子  
 • electrons 电子 • atom 原子

### Objective

Build the skills to answer exam questions on **simple molecules and covalent bonds**  
 简单分子与共价键 — sharing electrons, dot-and-cross diagrams, and the properties of simple molecular substances.

**You must be able to:**

- describe a covalent bond (a shared pair of electrons between non-metals)
- draw/interpret dot-and-cross diagrams ( $\text{H}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{CH}_4$ , etc.)
- explain why simple molecular substances have low melting points and don't conduct

### 1 Worked examples

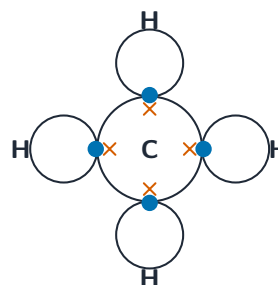
#### ■ Covalent bonding



hydrogen,  $\text{H}_2$   
one shared pair



water,  $\text{H}_2\text{O}$   
two shared pairs



methane,  $\text{CH}_4$   
four shared pairs

*Atoms share pairs of electrons so each reaches a full outer shell*

- **covalent bond:** a shared pair of electrons (between non-metals).
- **low melting point:** weak intermolecular forces between molecules (the bonds inside are strong).
- **poor conductor:** no free electrons or ions to carry charge.

## 2 Practice

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**2.1** Define a covalent bond. [1]

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**2.2** State how many shared pairs of electrons there are in a molecule of methane, CH<sub>4</sub>. [1]

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## 3 Exam-style questions

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**3.1** Simple molecular substances have low melting points because: [1]

|   |   |
|---|---|
| A | B |
| C | D |

**A** the covalent bonds are weak

**B** the forces between molecules are weak

**C** they contain ions

**D** they have delocalised electrons

**3.2** Water, H<sub>2</sub>O, is a simple molecule.

(a) Describe how the bonds in a water molecule form. [2]

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(b) Explain why water does not conduct electricity (when pure). [2]

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**3.3** Explain why chlorine, Cl<sub>2</sub>, has a low boiling point. [2]

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