

# 2 Atoms and elements – 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) |       |       |
|---------------|-----|----------------------------|-------|-------|
| atom          | 原子  | _____                      | _____ | _____ |
| element       | 元素  | _____                      | _____ | _____ |
| compound      | 化合物 | _____                      | _____ | _____ |
| mixture       | 混合物 | _____                      | _____ | _____ |
| nucleus       | 原子核 | _____                      | _____ | _____ |
| protons       | 质子  | _____                      | _____ | _____ |
| neutrons      | 中子  | _____                      | _____ | _____ |
| Electrons     | 电子  | _____                      | _____ | _____ |
| shells        | 电子层 | _____                      | _____ | _____ |
| proton number | 质子数 | _____                      | _____ | _____ |
| mass number   | 质量数 | _____                      | _____ | _____ |
| Isotopes      | 同位素 | _____                      | _____ | _____ |

## Recall

All substances are built from about 100 simple building blocks. Sorting them into three groups, and looking inside the **atom** 原子, is where the IGCSE course begins.

- Everything is made of **atoms**.
- Atoms join together in different ways.

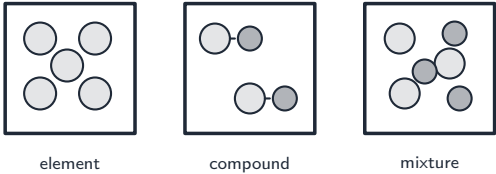
Nothing here is hard — it just sorts and names things.

## New ideas

Read these first, then do the Practice.

### ■ 1 Element, compound, mixture

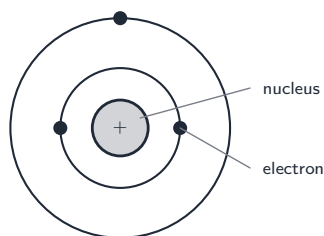
- an **element** 元素 has only **one** type of atom (e.g. copper, oxygen).
- a **compound** 化合物 is two or more elements **chemically joined** (bonded) in a fixed ratio (e.g. water).
- a **mixture** 混合物 is substances just **mixed**, not bonded, and easy to separate (e.g. air).



### ■ 2 Inside the atom

The tiny **nucleus** 原子核 holds **protons** 质子 (charge +1) and **neutrons** 中子 (charge 0). **Electrons** 电子 (charge -1) move in **shells** 电子层 around it.

| Particle | Relative mass | Relative charge |
|----------|---------------|-----------------|
| proton   | 1             | +1              |
| neutron  | 1             | 0               |
| electron | ≈ 0           | -1              |



lithium (2,1)

The **proton number** 质子数 names the element. The **mass number** 质量数 is protons + neutrons.

### ■ 3 Isotopes

**Isotopes** 同位素 are atoms of the **same** element (same protons) with **different** numbers of neutrons. They have the **same chemical properties** (chemistry depends on electrons).

**Watch out:** the **proton number** names the element; the **mass number** is protons + neutrons, so neutrons = mass number – proton number (not just the mass number). Isotopes react the same because chemistry depends on the *electrons*, which are unchanged.

## Practice

Try these in order.

**2.1** Define an *element* and a *compound*. [2]

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**2.2** State the charge on (a) a proton, (b) a neutron, (c) an electron. [3]

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**2.3** An atom has 11 protons and 12 neutrons. Give its (a) proton number, (b) mass number. [2]

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**2.4** Write the electronic configuration of sodium (11 electrons). [1]

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**2.5** What are isotopes? [2]

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**2.6 Challenge.** Chlorine has two isotopes, chlorine-35 and chlorine-37 (both with proton number 17). State how many neutrons each has, and explain why they react in exactly the same way. [3]

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