

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.

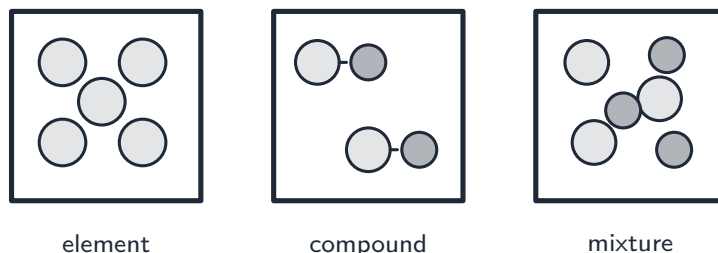
Nothing here is hard — it just sorts and names things.

New ideas

Read these first, then do the Practice.

■ 1 Element, compound, mixture

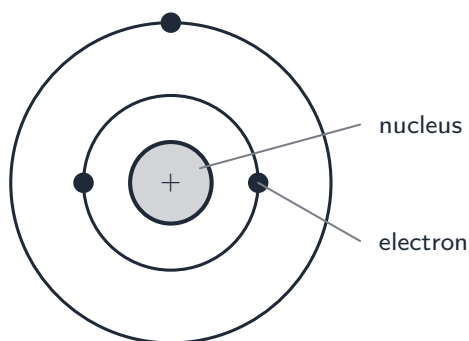
- an **element** 元素 has only **one** type of atom (e.g. copper, oxygen).
- a **compound** 化合物 is two or more elements **chemically joined** (bonded) in a fixed ratio (e.g. water).
- a **mixture** 混合物 is substances just **mixed**, not bonded, and easy to separate (e.g. air).



■ 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]

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

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

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

2.5 What are isotopes? [2]

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]