5 The atom – 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)		
atoms	原子			
nucleus	原子核			
electrons	电子			
neutral	中性			
protons	质子			
neutrons	中子			
orbits	轨道			
mass	质量			
proton number	质子数			
nucleon number	核子数			
ion	离子			
Isotopes	同位素			

Recall

Everything is made of **atoms** 原子. The IGCSE course looks inside the atom – at its tiny **nucleus** 原子核 and the **electrons** 电子 around it.

- The nucleus is positive; the electrons are negative.
- The whole atom is **neutral** 中性 (the charges balance).

Nothing here is hard – it just names the parts.

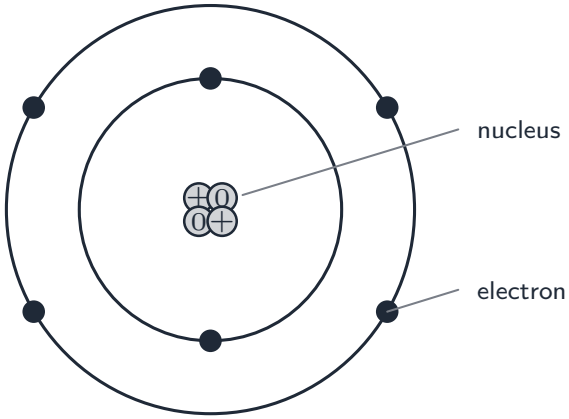
New ideas

Read these first, then do the Practice.

1 Inside the atom

- the tiny central **nucleus** 原子核 holds **protons** 质子 (charge +1) and **neutrons** 中子 (charge 0).
- **electrons** 电子 (charge −1) move around it in **orbits** 轨道.

Almost all the **mass** 质量 is in the nucleus, but the atom is mostly empty space.



2 Proton number and nucleon number

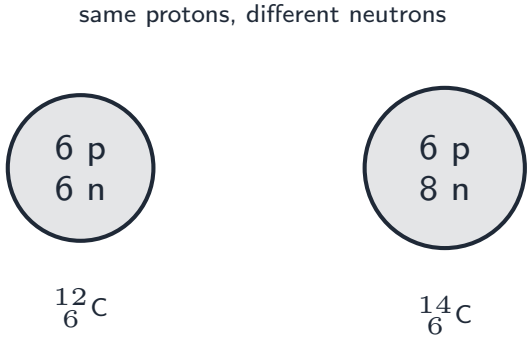
- the **proton number** 质子数 (Z) is the number of protons.
- the **nucleon number** 核子数 (A) is the number of protons **plus** neutrons.

So the number of neutrons is $A - Z$. We write a nucleus as ${}^{A}_{Z}\mathrm{X}$.

An atom can gain or lose electrons to become an **ion** 离子 (lose → positive, gain → negative).

3 Isotopes

Isotopes 同位素 are atoms of the **same** element (same Z) with **different** numbers of neutrons (different A).



Watch out: the proton number Z counts only protons; the nucleon number A counts protons **plus** neutrons – so neutrons $= A - Z$, never just A. Isotopes share Z (same element) but differ in A.

Practice

Try these in order.

5.1 Name the two particles found in the nucleus. [2]

5.2 What is the charge on (a) a proton, (b) an electron? [2]

5.3 A nucleus is written $^{197}_{79}$Au. How many (a) protons, (b) neutrons does it have? [2]

5.4 An atom loses an electron. What kind of ion does it become? [1]

5.5 What is meant by *isotopes*? [2]

5.6 Challenge. An atom of $^{23}_{11}\text{Na}$ loses one electron to become an ion. State the number of (a) protons, (b) neutrons and (c) electrons in this ion. [3]