SCIENCE FOUNDATIONS

Atoms, protons, neutrons, and electrons

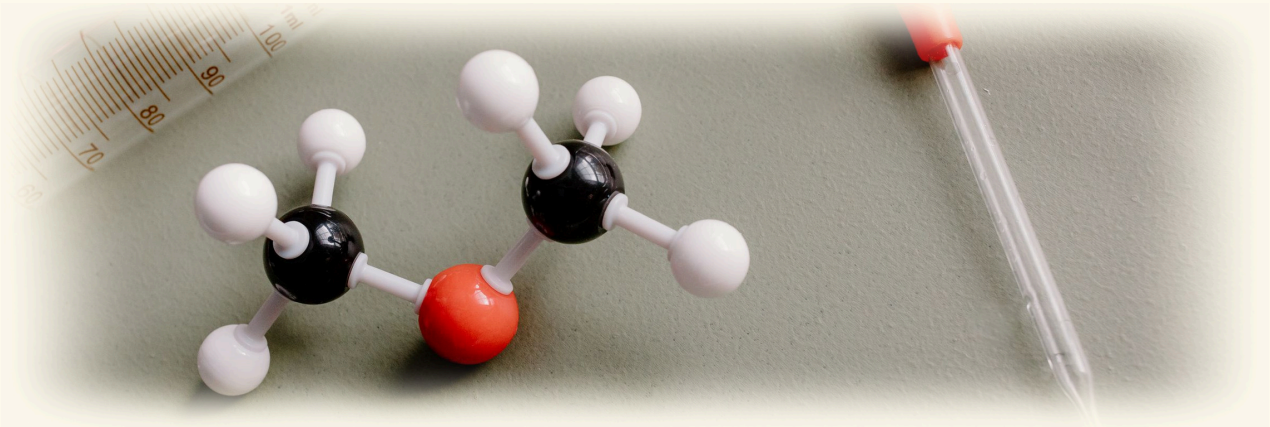
Difficulty level: Intermediate

Science Foundations

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how you explain what everything around you is made of, from the air you breathe to the phone in your hand, by the tiny particles inside each atom. Every atom has protons and neutrons in its centre and electrons moving around them, and the number of protons decides which element it is. The air, the water, and the metal in your phone are all built from the same three particles, just put together in different numbers. Once you know the particles, the whole material world starts to make sense as different arrangements of the same small pieces.

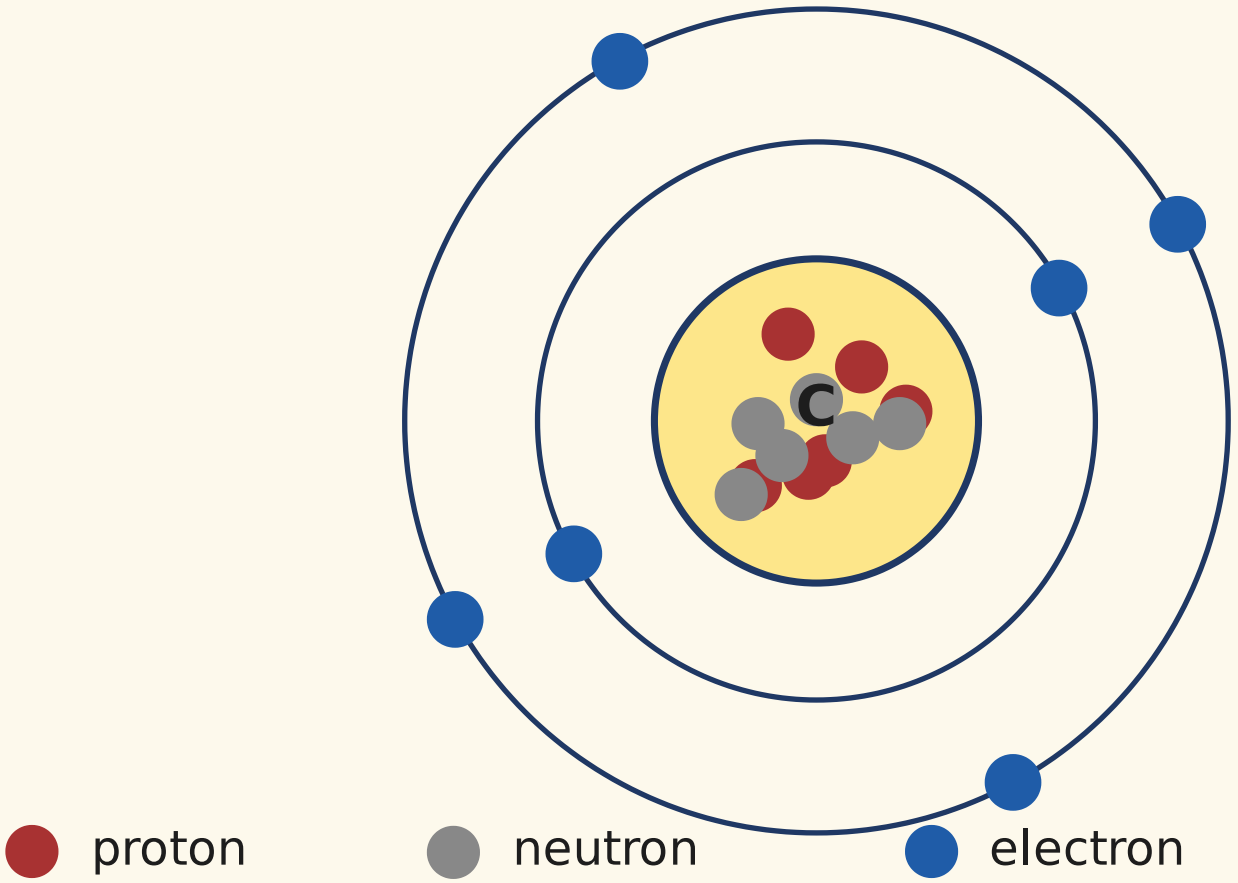


© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q A carbon atom has 6 protons, 6 neutrons, and 6 electrons. Where is each particle, what is its charge, and what is its mass number?



SOLUTION

This is a where-are-the-particles question: name each particle and where it sits, then the charge, then the mass number.

Nucleus: 6 protons (+) and 6 neutrons (no charge).

Around the nucleus: 6 electrons (–), 2 in the first shell and 4 in the second.

Charge: 6 (+) and 6 (–) balance, so the atom is neutral.

Mass number = 6 + 6 = 12

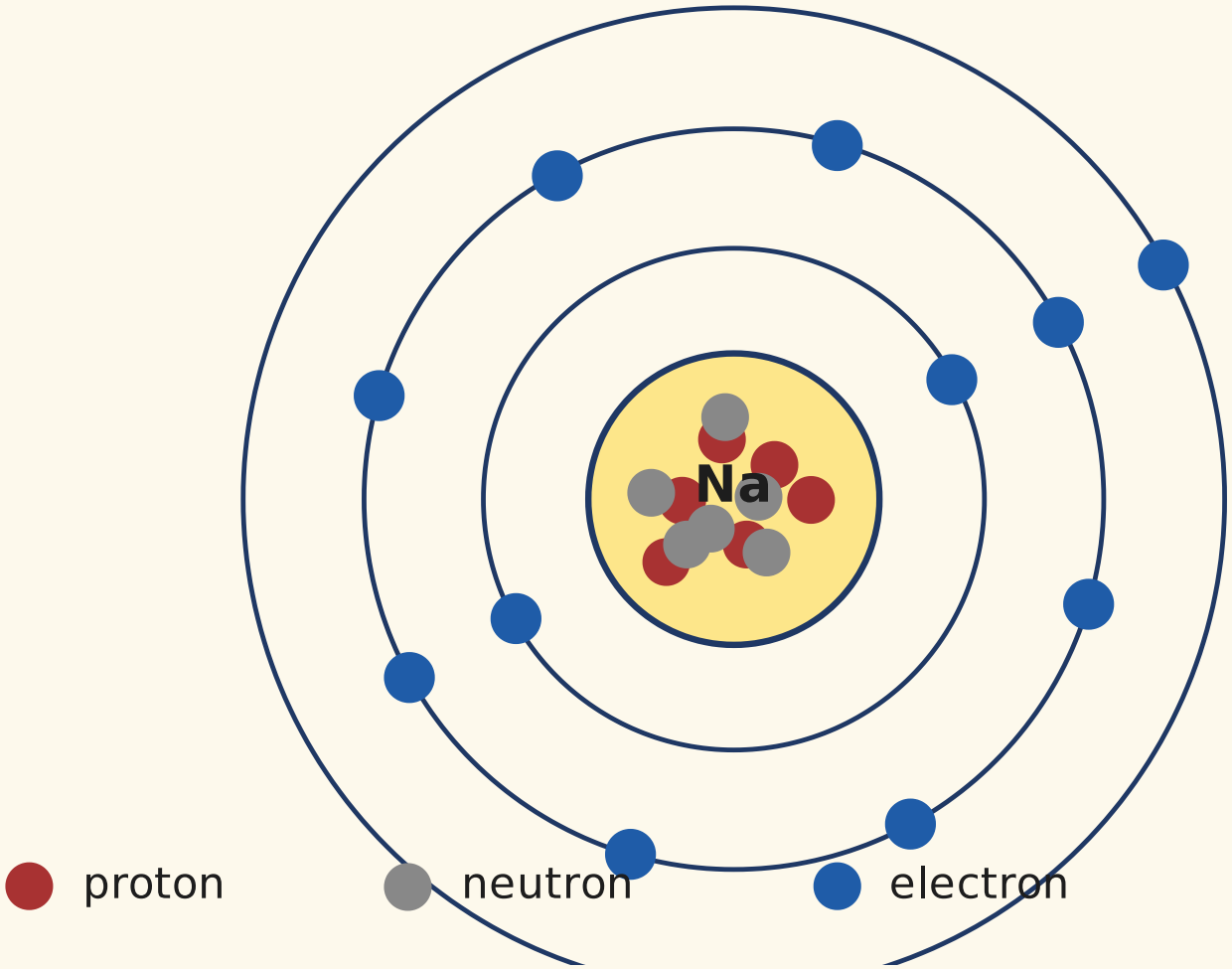
© 2026 Brett Robbins. All Rights Reserved.

The result is neutral carbon atom, mass number 12.

© 2026 Brett Robbins. All Rights Reserved.

EXAMPLE 2

Q **A sodium atom has 11 protons, 12 neutrons, and 11 electrons. Where is each particle, what is its charge, and what is its mass number?**



SOLUTION

Nucleus: 11 protons (+) and 12 neutrons (no charge).

Around the nucleus: 11 electrons (–), 2 in the first shell, 8 in the second, and 1 in the third.

Charge: 11 (+) and 11 (–) balance, so the atom is neutral.

Mass number = 11 + 12 = 23

The result is neutral sodium atom, mass number 23.

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 **Describe a nitrogen atom with 7 protons, 7 neutrons and 7 electrons. Where is each particle, and what is the overall charge?**

- **A** 7 protons and 7 neutrons in the nucleus, 7 electrons around the nucleus, neutral
- **B** 7 protons and 7 electrons in the nucleus, 7 neutrons around the nucleus, neutral
- **C** 7 protons and 7 neutrons in the nucleus, 7 electrons around the nucleus, positive
- **D** 7 neutrons in the nucleus, 7 protons and 7 electrons around the nucleus, neutral

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

2 An atom has 8 protons and 10 electrons. What is its overall charge?

- **A** Positive
- **B** Negative
- **C** Neutral
- **D** No charge

Understand It with Pulse | Flag a mistake

3 How many electrons are in the first shell of a potassium atom?

- **A** 1
- **B** 2
- **C** 8
- **D** 19

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

4 An atom has 12 protons and 12 neutrons. What is its mass number?

- A 12
- B 24
- C 0
- D 6

Understand It with Pulse | Flag a mistake

5 Charge of a proton?

- A Positive
- B Negative
- C No charge
- D Both

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

6

Charge of a neutron?

A Positive

B Negative

C No charge

D Both

Understand It with Pulse | Flag a mistake

7

Charge of an electron?

A Positive

B Negative

C No charge

D Both

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

8 Which particles give an atom most of its mass?

- A Electrons
- B Protons and electrons
- C Neutrons and electrons
- D Protons and neutrons

Understand It with Pulse | Flag a mistake

9 An atom has 6 protons and 6 electrons. What is its charge?

- A Positive
- B Negative
- C Neutral
- D No charge

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

10

Where are electrons found in an atom?

A In the nucleus

B Around the nucleus

C In the nucleus with the protons

D Outside the atom

Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. 7 protons and 7 neutrons in the nucleus, 7 electrons around the nucleus, neutral

2. Negative

3. 2

4. 24

5. Positive

6. No charge

7. Negative

8. Protons and neutrons

9. Neutral

10. Around the nucleus

© 2026 Brett Robbins. All Rights Reserved.