



What is Inside an Atom

KS4 PHYSICS

Ages 10-14 ⌚ 3 min read

Atoms Are Tiny Building Blocks

Everything around you is made of **atoms** — the tiniest pieces of matter that exist. Atoms are so incredibly small that millions of them could fit on the tip of a pencil. But even though atoms are tiny, they have an even tinier structure inside them. Understanding what's inside an atom helps us understand how the whole world works.

The Nucleus: The Heart of an Atom

At the centre of every atom is a dense region called the **nucleus**. This is like the control centre of the atom. The nucleus contains two types of particles called **protons** and **neutrons**. Protons have a positive electrical charge, while neutrons have no charge at all. Both protons and neutrons are roughly the same size and weight, and they stick together very tightly in the nucleus.

Think of it like a crowded sports stadium: the nucleus is like the packed centre where all the action happens, and it contains the most stuff in a small space.

Electrons: The Outer Orbits

Spinning around the nucleus in different layers or **shells** are tiny particles called **electrons**. Electrons are much, much smaller and lighter than protons and neutrons — about **2,000 times** lighter! Electrons have a negative electrical charge, which is opposite to the positive charge of protons. The electrons zoom around the nucleus incredibly fast, like planets orbiting the Sun.

Think of it like a solar system: the nucleus is the Sun in the middle, and electrons are like planets circling around it in orbits.

Why This Structure Matters

The arrangement of protons, neutrons, and electrons determines what an atom is and how it behaves. The number of protons tells us what **element** an atom is — for example, if it has **6 protons**, it's carbon; if it has **8 protons**, it's oxygen. The

electrons are responsible for how atoms bond together and create the materials we see every day, from water to wood to metal. Understanding the structure of atoms is key to understanding chemistry, energy, and nearly everything in science.