



The Smallest Particles That Make Up Everything

KS4 PHYSICS

Ages 11-15



3 min read

What Are Atoms?

Everything you can see, touch, or taste—your phone, your food, even you—is made of incredibly tiny building blocks called **atoms**. Atoms are so small that you could fit billions of them on the head of a pin. For hundreds of years, people thought atoms were the smallest possible thing in the universe. But scientists eventually discovered that atoms themselves are made of even smaller particles.

Think of it like a LEGO brick. Just as LEGO bricks are made from smaller pieces of plastic, atoms are made from smaller particles stuck together.

What's Inside an Atom?

At the centre of every atom is something called a **nucleus**. Inside the nucleus are two types of particles: **protons**, which carry a positive electric charge, and **neutrons**, which have no electric charge. Whizzing around the nucleus in clouds called **electron shells** are **electrons**, which carry a negative electric charge. Different atoms have different numbers of these particles, which is why we have **over 100 different elements**—like hydrogen, carbon, oxygen, and iron.

Think of it like a solar system. The nucleus is like the Sun in the middle, and electrons orbit around it like planets, but they move much faster and in clouds rather than solid paths.

Can We Go Even Smaller?

Scientists have discovered that protons and neutrons are actually made of even tinier particles called **quarks**. In fact, quarks and electrons might be the truly smallest building blocks of matter—at least with our current technology. This field of science is called **particle physics**, and physicists keep discovering new and stranger particles hidden inside atoms.

Why Does This Matter?

Understanding atoms and their particles helps us explain how everything works: why metals conduct electricity, how medicines heal us, what stars are made of, and even why you can't walk through a wall. It's the key to understanding the entire universe. Every atom in your body was created billions of years ago inside a dying star, which means we're all literally made of star stuff.

Think of it like understanding the alphabet. Just as all English words are built from 26 letters, all matter in the universe is built from these tiny atomic particles.