Atoms and Their Building Blocks Explained

KS4 CHEMISTRY Ages 11-14 ⏰ 3 min read

What Are Atoms?

Atoms are the tiniest pieces of matter that everything is made from. They're so small that millions of atoms could fit on the head of a pin. Every object you can see — your phone, this page, even you — is made of atoms stuck together.

For a long time, scientists thought atoms were solid balls that couldn't be broken down further. But in **1897**, scientist **J.J. Thomson** discovered that atoms are actually made of even smaller particles. This was a huge surprise!

Think of it like opening a Russian nesting doll. You think the doll is the smallest thing, but when you open it, there's another doll inside, and another, and another.

The Three Main Particles

Every atom contains three types of particles: **protons**, **neutrons**, and **electrons**.

Protons and **neutrons** are found in the centre of the atom in a region called the **nucleus**. Protons have a positive electrical charge, while neutrons have no charge at all. **Electrons** are found orbiting around the nucleus in shells or energy levels. They have a negative electrical charge.

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

How Are Atoms Arranged?

The electrons aren't floating around randomly. They orbit the nucleus in specific layers called **electron shells** or **energy levels**. The first shell, closest to the nucleus, can hold up to **2** electrons. The second shell can hold up to **8**. These shells must be filled in order before electrons move to the next level.

Different atoms have different numbers of protons, neutrons, and electrons. An atom of **hydrogen** has just **1** proton and **1** electron. An atom of **carbon** has **6** protons and **6** electrons. An atom of **oxygen** has **8** protons and **8** electrons. The number of protons determines what element the atom is.

Think of it like a parking lot with reserved spaces. The first row has spots for 2 cars, the second row has spots for 8 cars. You have to fill the first row before parking in the second row.

This amazing arrangement of particles is what makes atoms work and allows them to bond with other atoms to create all the materials in our universe.