How to read the periodic table

The **periodic table** contains all the known **elements**. Elements are substances that contain only one type of **atom**. An atom is the basic building block for all matter – they're not the smallest or simplest particles that exist, but they are the smallest, simplest parts of an element and they uniquely define each one, depending on their composition.

Different elements join together chemically to make **compounds**, but the periodic table only contains the elements. So, while water isn't found in the table, the elements it is composed of, hydrogen and oxygen, both are.

Did you know…?

Everything in the universe is made of different combinations of elements and the elements that make up our world originated in the stars. So, we really can say that we are made of stars!

Reading and writing chemical symbols

Chemists spend a lot of time talking and writing about elements: what they're like, how they react, how they change. Giving them **symbols** makes this process clearer, especially as these symbols are recognised all over the world, even if the names themselves vary in different languages.

When you write the symbol for an element, it's really important that the first letter is a capital and the second letter (if it has one) is lower case. This means that, however many elements might be listed in an equation, you'll always be able to distinguish between them.

Periodic tables generally display two numbers with each element. The smaller number of the pair is the **atomic number**. This is the number of **protons**, which is unique to each element and doesn't change. The larger number is the **relative atomic mass** of an element – the higher the number, the greater its mass.

More elements could be added to the periodic table in the future. Four **new elements** were recognised in 2016 but they were made in a laboratory and can only exist for a short time.

Using the table's structure

Within the table, the arrangement of the elements means that their properties vary **periodically**. Each row is called a **period**, and in each period, there are repeating patterns in the **chemical and physical properties** of the elements in each one. For example, you'll find **metals** on the left-hand side and **non-metals** on the right.

Chemists can make predictions about elements based on where they are in the periodic table. Elements in the same column or **group** have similar properties and within each group their properties vary in a predictable way. For example, elements

towards the bottom of the first group react more readily than the elements higher up in the group.

The block in the middle of the table, beginning in the fourth period, contains the **transition elements**. These are metals and often react with other elements to form brightly coloured compounds. They are usually relatively hard and are often used as **catalysts** (they help speed up chemical reactions, without being used up in the reactions themselves).

The periodic table is useful to chemists because of the way the elements are arranged but this didn't happen quickly or by chance. Several scientists arranged the elements they knew about in different ways before **Dmitri Mendeleev** arranged them as they are today. This was impressive, because he left gaps for elements that hadn't been discovered yet and he did this before we fully understood the structure and composition of atoms.