Atoms

It’s a word you hear quite often. It has found its way into our everyday language, where it’s associated with

- breaking into small pieces
- energy and power
- tiny particles
- anything very small.

But in science it has a specific meaning. An atom is the basic unit of matter.

An atom is the smallest particle of matter that can exist on its own.

We can break an atom of a substance into smaller bits (see Activity Sheet 1.4) but doing this destroys the substance (that is, the particular type of matter made by the atom), and we don’t know how to put that atom back together again.

As far as we know at the moment, atoms can only be made in the huge gravity field inside a star. Some of the heavier atoms, like silver or bromine, only got made when a star exploded in a supernova.
A substance that contains only one type of atom is called an element.

A list of all the elements, in order of the mass of their atoms, and arranged in columns according to their properties, was first drafted by a Russian scientist about 150 years ago. You will probably have seen it; it’s the Periodic Table.

The Periodic Table now shows the 118 types of atom that we currently know about; of these only about 90 types occur naturally on the Earth (the others have been made in huge collider machines by atomic scientists).

In our everyday lives, we only use about 40 of the natural elements. These are mostly the lighter ones.

These are some common elements: oxygen, carbon, zinc, copper, aluminium, iron, sulphur, nitrogen, helium, hydrogen, neon.

**Compounds, molecules and ions**

Elements can be combined in many different ways, and a combination of elements is called a pure compound. Millions of different pure compounds can be made from the 40 everyday elements. To make a compound, atoms link together to make small groups called molecules, or giant three-dimensional arrays of atoms called Giant Structures.
Sometimes the atoms have an electrical positive or negative charge. These particles are called ions.

To become more stable, atoms join together in chemical reactions.

It’s chemical bonds that hold the atoms in a compound together. Just like Lego, a small number of different units can be combined to make millions of different things.

**Task:** Write a sentence with the word ‘atom’ in to answer each of these questions

1. What is an atom?
2. Where are atoms made?
3. What is an element?
4. Name five elements.
5. What is a molecule?
6. What is meant when we say a compound has a Giant Structure?
7. What is the difference between an atom and an ion?
8. Why are atoms like Lego bricks?