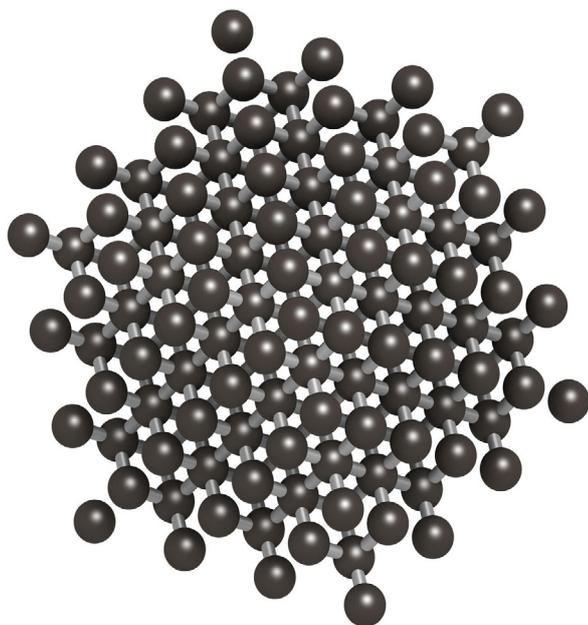


## MODULE: *Matter 1*

### Activity Sheet 1.7: More about atoms

Remember: one particle of a substance is an *atom*. Lots of the same type of atoms together make a substance we call an element.



- The number of protons decides the number of electrons that will be orbiting around the nucleus. There is usually the same number of protons and electrons, so that the atom has no electrical charge (neutral atom).
- Only the outer shell of an atom comes into contact with other atoms; the way that contact happens decides how that element reacts.
- The reactions of an atom with other atoms are one of the chemical properties of the element; other properties include its density and its melting point.
- An atom's properties are decided by the number of protons it has in its nucleus.

Around the nucleus are the electrons, in shells. There are rules governing where the electrons go in these shells. The electrons fill up the shells in order, the smallest shell first. The negative charges of the electrons repel each other, so too many electrons trying to crowd in get pushed away.

- 2 electrons fill up the first shell
- the next 8 electrons fill up the second shell
- the next 18 electrons go into the third shell
- after that it goes 32, 50, 72 ... (but at those higher levels, a shell doesn't have to be completely filled before an electron goes into the next shell).

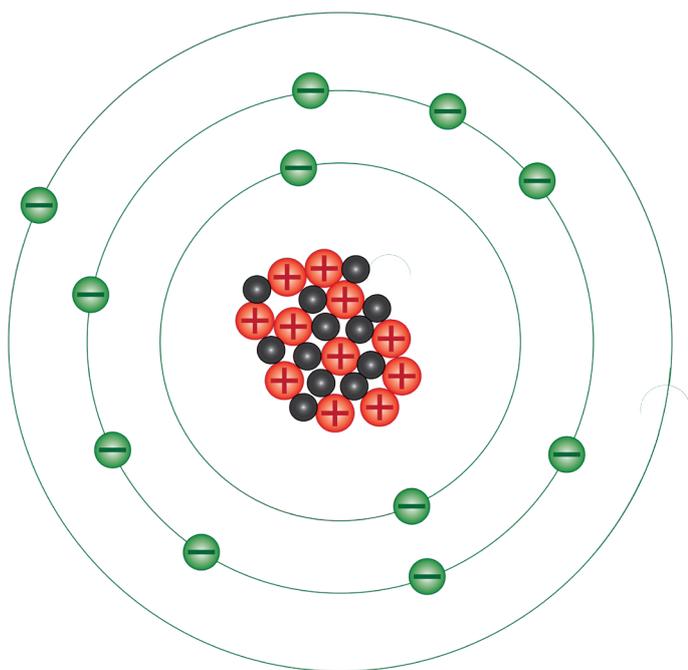
There can be up to 7 separate shells of electrons round an atom (but only the biggest and heaviest atoms have so many shells).

If the outer shell of electrons is not filled up, that makes the atom more likely to join up with another type of atom, to form a compound). That is called 'chemically reactive'.

### Your task

Draw a diagram of these atoms to show how they are constructed.

An example, sodium, has been drawn for you.



- |    |                   |            |             |              |
|----|-------------------|------------|-------------|--------------|
| 1. | <b>oxygen</b>     | 8 protons  | 8 neutrons  | 8 electrons  |
| 2. | <b>magnesium</b>  | 12 protons | 12 neutrons | 12 electrons |
| 3. | <b>lithium</b>    | 3 protons  | 4 neutrons  | 3 electrons  |
| 4. | <b>phosphorus</b> | 15 protons | 16 neutrons | 15 electrons |

How many of these atoms are chemically reactive?