

## 1. Structure of the Atom

In this lesson you will learn:

- What an atom consists of and how these particles are arranged.
- The properties of each subatomic particle.
- The definitions for mass number and atomic number.
- To interpret nuclear symbols for both atoms and ions.

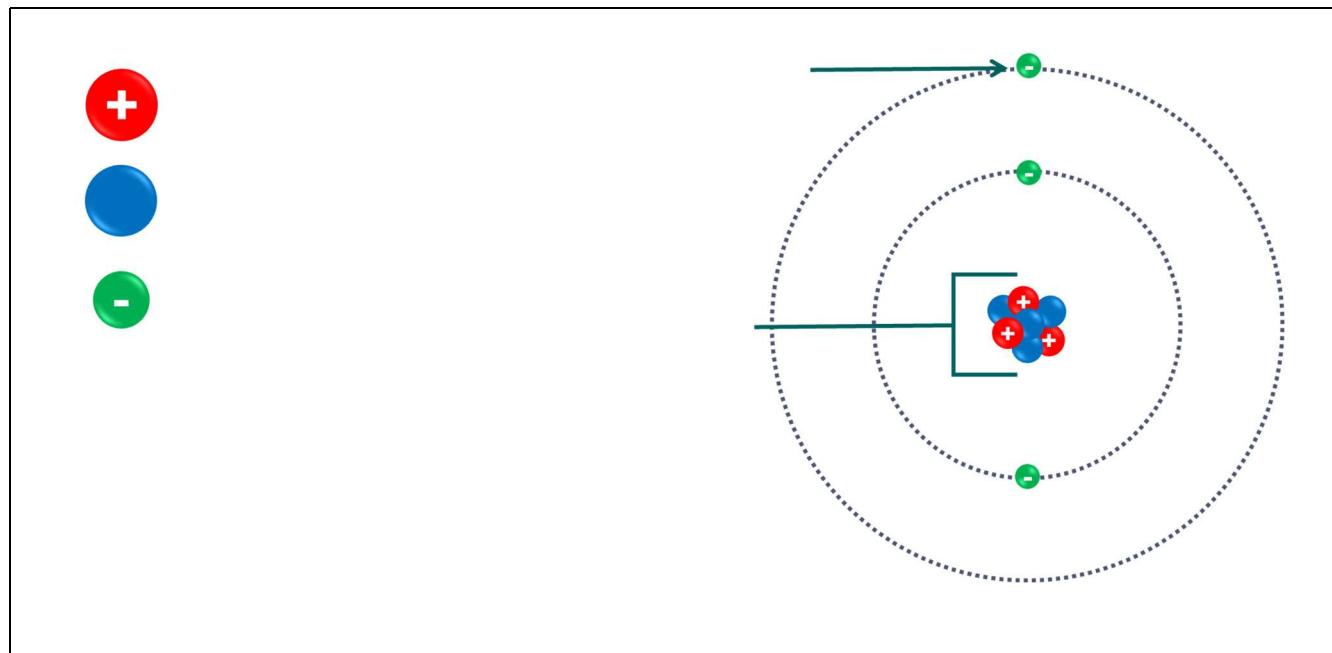


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### Atomic Structure

Atoms are made up of three subatomic particles: protons, neutrons and electrons. Protons and neutrons are located at the centre of the atom in a structure called the nucleus. Electrons are in electron shells, or energy levels surrounding the nucleus.

➤ Complete the diagram of an atom below by adding labels and annotations identifying key details:



### Properties of Subatomic Particles

The actual mass and charge of subatomic particles is incredibly small, far too small for us realistically use on a day-to-day basis. As such, scientists use the relative mass and relative charge instead.

➤ Complete the table below summarising the key properties of each subatomic particle:

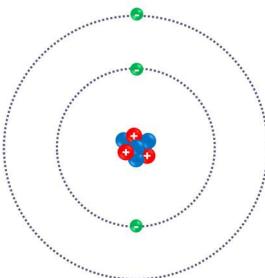
Subatomic Particle	Location	Relative Mass	Relative Charge
Proton			
Neutron			
Electron			

The relative charge of protons and electrons is equal but opposite. This means that the positive charge from 1 proton would be cancelled out by the negative charge of 1 electron. Atoms have no overall charge; this means that in atom there must be the same number of protons as electrons.

### Nuclear Symbols

Elements are defined by the number of protons located in the nucleus of an atom or ion. All atoms or ions of the same element will contain the same number of protons.

➤ *Annotate the diagram below to explain why it is an atom, and why it is an atom of lithium:*



Nuclear symbols are made up of three component parts, the element symbol, which is taken straight from the periodic table, the atomic number, also found on the periodic table, and the mass number. Nuclear symbols allow you to determine the numbers of each subatomic particle in an atom or ion.

➤ *Label the nuclear symbol below, include definitions for atomic and mass number and explain how to calculate the numbers of each subatomic particle:*

 Protons

 Neutrons

 Electrons



➤ Determine the numbers of subatomic particles present for each of the following nuclear symbols:



Protons:



Protons:

Neutrons:

Neutrons:

Electrons:

Electrons:



Protons:



Protons:

Neutrons:

Neutrons:

Electrons:

Electrons:

➤ Draw nuclear symbols for the following:

An atom of lithium with 3 neutrons:

A Cl<sup>-</sup> ion with 18 neutrons: