Summary sheets - 1

KS4 – Atomic structure

**Subatomic particles:** nucleus (protons and neutrons), electrons in shells.

Describe the particles in terms of their relative masses and relative charges:

* Protons – mass 1, charge +1.
* Electrons – mass = negligible ( ), charge –1.
* Neutrons – mass = 1, charge = 0.

**Notes**

* Number of protons = number of electrons (uncharged/neutral atoms).
* Proton number = atomic number.
* Mass number = protons + neutrons.

KS4 – Isotopes and calculating relative isotopic mass

Isotopes are *atoms* of the same elements which have different numbers of *neutrons* but the same number of *protons*.



Relative isotopic mass =

KS4 – Electron configuration

Filling electron shells

* *n* = 1, maximum = 2e–
* *n* = 2; maximum = 8e–
* *n* = 3 ;maximum = 18e–
* *n* = 4; maximum = 32e–

**Representing electron configurations**

* Write as, e.g. 2.8.3 or 2,8,3

Using the Periodic Table

* Period number (row) = number of shells
* Group number (column) = number of electrons in the outer (last) shell

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Group number | 1 | | 2 | | 3 | |  | | 5 | | 6 | | 7 | |
|  | **Li** |  | **Be** |  | **B** |  |  |  | **N** |  | **O** |  | **F** |  |
|  | Atom | Ion | Atom | Ion | Atom | Ion |  |  | Atom | Ion | Atom | Ion | Atom | Ion |
| **Electrons** | –3 | –2 | –4 | –2 | –5 | –2 |  |  | –7 | –10 | –8 | –10 | –9 | –10 |
| **Protons** | +3 | +3 | +4 | +4 | +5 | +5 |  |  | +7 | +7 | +8 | +8 | +9 | +9 |
| **Overall charge** | 0 | 1+ | 0 | 2+ | 0 | 3+ |  |  | 0 | 3– | 0 | 2– | 0 | 1– |
| **Electron configuration** | 2.1 | 2 | 2.2 | 2 | 2.3 | 2 |  |  | 2.5 | 2.8 | 2.6 | 2.8 | 2.7 | 2.8 |
| **Name of ions** | lithium | | beryllium | | boron | |  | | nitride | | oxide | | fluoride | |
|  | Lose electrons, charge = +group number | | | | | | | | Gain electrons, charge = group number – 8 | | | | | |