

Section A: Key Vocabulary

Keyword	Definition
Atomic number	The number of protons in the nucleus of an atom. Also known as the proton number.
Electron	A tiny particle with a negative charge and very little mass.
Electronic configuration	The arrangement of electrons in shells around the nucleus of an atom.
Group	A vertical column in the periodic table.
Ion	An atom or group of atoms with an electrical charge due to the gain and loss of electrons.
Isotopes	Atoms of an element with the same number of protons but different number of neutrons.
Mass number	Total number of protons and neutrons in the nucleus of an atom.
Neutrons	Particle found in the nucleus of an atom having zero charge and mass of one.
Nuclear fission	When the nucleus of a large atom such as uranium splits into two smaller nuclei.
Nucleus	The central part of an atom or ion.
Period	A horizontal row in the periodic table.
Periodic table	The chart in which the elements are arranged in order of increasing atomic number.
Proton	Particle found in the nucleus of an atom having a positive charge and mass of one.
Subatomic particles	A particle that is smaller than an atom, such as a proton, neutron or electron.

Section B: Fundamentals
Relative Masses and Charges

Protons, neutrons and electrons have very, very small masses and electric charges. So, rather than using their actual masses and charges. It is easier to use **relative masses** and **relative charges** compared to a proton.

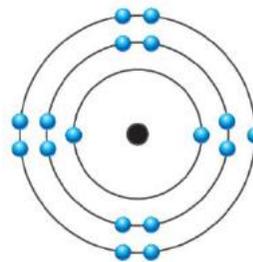
Subatomic particle	Relative charge	Relative mass
proton	+1 (positive)	1
electron	-1 (negative)	1/1835 (negligible)
neutron	0 (no charge)	1

Electronic Structure

Electrons occupy electron shells arranged around the nucleus. Shells are modelled in diagrams as circles with electrons as dots and crosses on each circle. Each shell can contain different numbers of electrons:

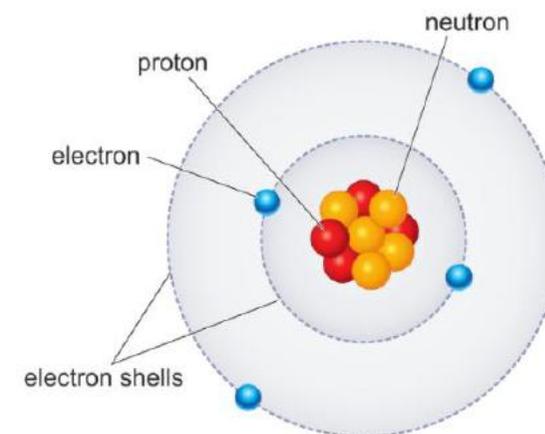
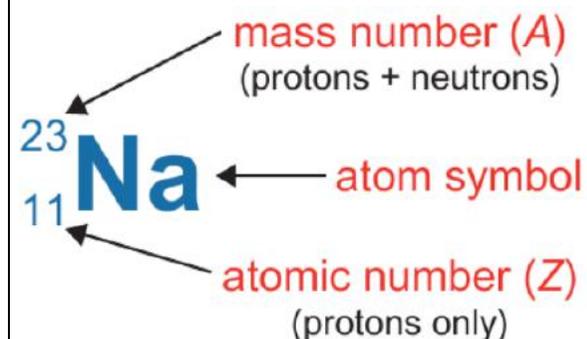
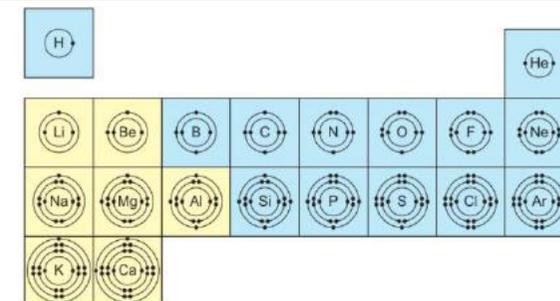
- First shell can contain up to 2 electrons
- Second and third shells can contain up to 8 electrons.

Occupy the shells starting with the **innermost shell and work outwards.**

Electronic structure of chlorine:


To work out electronic configuration: the numbers show how many electrons occupy a shell, and the full stops separate each shell.

electronic configuration of chlorine: 2.8.7

Section C: Diagrams
Structure of an Atom

Atomic and Mass Number

Electronic Structure of First 20 Elements


Year 9 Autumn Term – C3-4 Atomic Structure and The Periodic Table
Section A: Key Vocabulary (Higher)

Keyword	Definition
Abundance	<p>A measure of how common something is. When considering isotopes, we can use the abundance to calculate the relative atomic mass.</p> <p>For example:</p> <p>The abundances of the two isotopes of chlorine are 75% of $^{35}\text{Cl}_{17}$ and 25% of $^{37}\text{Cl}_{17}$.</p> <p>We can calculate the relative atomic mass of chlorine using these abundances:</p> <p>If we take 100 atoms, the relative atomic mass =</p> $\frac{\text{total mass of the atoms}}{\text{the number of atoms}}$ $= \frac{(75 \times 35) + (25 \times 37)}{100}$ $= \frac{2625 + 925}{100}$ $= \frac{3550}{100}$ <p>$A_r = 35.5$</p>

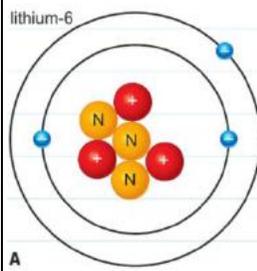
Section B: Fundamentals

History of the Atom	
Year	Name and Discovery
1803	 <p>John Dalton His theory stated that atoms are indivisible, those of a given element are identical, and compounds are combinations of different types of atoms.</p>
1897	 <p>J. J. Thomson Discovered the electron. Produced the 'plum pudding' model of the atom. It shows the atoms as composed of electrons scattered throughout a spherical cloud of positive charge.</p>
1911	 <p>Ernest Rutherford Fired positively charged alpha particles at a thin sheet of gold foil. Some deflected at large angles = positive charge concentrated in the centre: the nucleus.</p>
1913	 <p>Niels Bohr Stated that electrons move around the nucleus in orbits of fixed sizes and energies.</p>

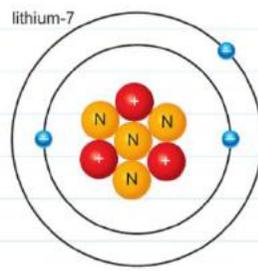
Section C: Diagrams

Isotopes

lithium-6



lithium-7



Mendeleev's Periodic Table

Series	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
1	H 1							
2	Li 7	Be 9.4	B 11	C 12	N 14	O 16	F 19	
3	Na 23	Mg 24	Al 27.3	Si 28	P 31	S 32	Cl 35.5	
4	K 39	Ca 40	? 44	Ti 48	V 51	Cr 52	Mn 55	Fe 56 Ni 59 Co 59 Cu 63
5	(Cu 63)	Zn 65	? 68	? 72	As 75	Se 78	Br 80	
6	Rb 85	Sr 87	Y 88	Zr 90	Nb 94	Mo 96	? 100	Ru 104 Pd 106 Rh 104 Ag 108
7	(Ag 108)	Cd 112	In 113	Sn 118	Sb 122	Te 125	I 127	
8	Cs 133	Ba 137	Di 138	Ce 140				
9								
10			Er 178	La 180	Ta 182	W 184		Os 195 Pt 198 Ir 197 Au 199
11	(Au 199)	Hg 200	Tl 204	Pb 207	Bi 208			
12				Th 231		U 240		

Rutherford's Scattering Experiment

