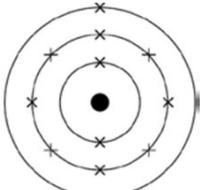


Chemistry Knowledge Organiser

Atomic structure and the Periodic table

1	Mixture	A mixture consists of two or more elements or compounds not chemically combined together. The chemical properties of each substance in the mixture are unchanged.								
2	Separation techniques	Mixtures can be separated by physical processes such as filtration, crystallisation, simple distillation, fractional distillation and chromatography. These physical processes do not involve chemical reactions and no new substances are made.								
4	Rutherford's Alpha scattering experiment	The plum pudding model of the atom had electrons spread throughout the atom. Rutherford fired alpha particles at gold foil , he expected them to pass straight through, but rarely one would bounce back. This proved that the positive charge and mass was concentrated in the nucleus.								
5	The atom	<table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th style="text-align: center;">Name of particle</th> <th style="text-align: center;">Relative charge</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Proton</td> <td style="text-align: center;">+1</td> </tr> <tr> <td style="text-align: center;">Neutron</td> <td style="text-align: center;">0</td> </tr> <tr> <td style="text-align: center;">Electron</td> <td style="text-align: center;">-1</td> </tr> </tbody> </table> <p style="display: inline-block; vertical-align: top; margin-left: 20px;">In an atom, the number of electrons is equal to the number of protons in the nucleus. Atoms have no overall electrical charge.</p>	Name of particle	Relative charge	Proton	+1	Neutron	0	Electron	-1
Name of particle	Relative charge									
Proton	+1									
Neutron	0									
Electron	-1									
6	Size and mass of atoms	<table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th style="text-align: center;">Name of particle</th> <th style="text-align: center;">Relative mass</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Proton</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">Neutron</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">Electron</td> <td style="text-align: center;">Very small</td> </tr> </tbody> </table> <p style="display: inline-block; vertical-align: top; margin-left: 20px;">Atoms are very small, having a radius of about 0.1 nm (1×10^{-10} m). The radius of a nucleus is less than 1/10 000 of that of the atom (about 1×10^{-14} m).</p>	Name of particle	Relative mass	Proton	1	Neutron	1	Electron	Very small
Name of particle	Relative mass									
Proton	1									
Neutron	1									
Electron	Very small									
7	Relative atomic mass	The relative atomic mass of an element is an average value that takes account of the abundance of the isotopes of the element (eg. Chlorine has a Mr of 35.5 due to the ratio of its 2 isotopes Cl-35 and Cl-37)								
8	Electronic structure	 <p>The electrons in an atom occupy the lowest available energy levels (innermost available shells). The electronic structure of an atom can be represented by numbers or by a diagram. For example, the electronic structure of sodium is 2,8,1.</p>								
9	The periodic table	The elements in the periodic table are arranged in order of atomic (proton) number and so that elements with similar properties are in columns, known as groups.								
10	Groups	Elements in the same group in the periodic table have the same number of electrons in their outer shell (outer electrons) and this gives them similar chemical properties.								

Chemistry Knowledge Organiser

Atomic structure and the Periodic table

11	Development of the periodic table	<p>The early periodic tables were incomplete and some elements were placed in inappropriate groups if the strict order of atomic weights was followed.</p> <p>Mendeleev overcame some of the problems by leaving gaps for elements that he thought had not been discovered and in some places changed the order based on atomic weights.</p>
12	Metals and non-metals	<p>Elements that react to form positive ions are metals.</p> <p>Elements that do not form positive ions are non-metals.</p> <p>The majority of elements are metals. Metals are found to the left and towards the bottom of the periodic table. Non-metals are found towards the right and top of the periodic table.</p>
13	Group 0	<p>The elements in Group 0 of the periodic table are called the noble gases. They are unreactive and do not easily form molecules because their atoms have stable arrangements of electrons. The noble gases have eight electrons in their outer shell, except for helium, which has only two electrons.</p>
14	Group 1	<p>The elements in Group 1 of the periodic table are known as the alkali metals and have characteristic properties because of the single electron in their outer shell.</p>
15	Group 7	<p>The elements in Group 7 of the periodic table are known as the halogens and have similar reactions because they all have seven electrons in their outer shell. The halogens are non-metals and consist of molecules made of pairs of atoms.</p> <p>In Group 7, the further down the group an element is the higher its relative molecular mass, melting point and boiling point.</p> <p>In Group 7, the reactivity of the elements decreases going down the group.</p>
16	Transition elements	<p>The transition elements are metals with similar properties which are different from those of the elements in Group 1.</p> <p>Many transition elements have ions with different charges, form coloured compounds and are useful as catalysts.</p>