

C2 – The Periodic table

Lessons TBAT	Key Knowledge	Practical	Assessment
<p>TBAT: Explain how the periodic table is arranged.</p> <p>TBAT: Describe the development of the periodic table</p> <p>TBAT: Describe and explain the reactions of the alkali metals.</p> <p>TBAT: Describe and explain the reactions of the halogens.</p>	<p>5.1.2.1 The periodic table</p> <p>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. The table is called a periodic table because similar properties occur at regular intervals. 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.</p> <p>Students should be able to:</p> <ul style="list-style-type: none"> • explain how the position of an element in the periodic table is related to the arrangement of electrons in its atoms and hence to its atomic number • predict possible reactions and probable reactivity of elements from their positions in the periodic table. <p>5.1.2.2 Development of the periodic table</p>	<p>Alkali metals demonstration.</p> <p>Group 7 displacement reactions.</p>	<p>End of topic assessment</p> <hr/> <p>Maths focus</p> <p>Electronic configuration</p>

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<p>TBAT: Explain why group 0 are unreactive.</p>	<p>Before the discovery of protons, neutrons and electrons, scientists attempted to classify the elements by arranging them in order of their atomic weights. The early periodic tables were incomplete and some elements were placed in inappropriate groups if the strict order of atomic weights was followed. 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. Elements with properties predicted by Mendeleev were discovered and filled the gaps. Knowledge of isotopes made it possible to explain why the order based on atomic weights was not always correct. Students should be able to describe these steps in the development of the periodic table.</p> <p>5.1.2.3 Metals and non-metals</p> <p>Elements that react to form positive ions are metals. Elements that do not form positive ions are non-metals. 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> <p>Students should be able to:</p> <ul style="list-style-type: none">• explain the differences between metals and non-metals on the basis of their characteristic physical and chemical properties. This links to Group 0 (page 74), Group 1 (page 74), Group 7 (page 75) and Bonding, structure and the properties of matter (page 75)• explain how the atomic structure of metals and non-metals relates to their position in the periodic table• explain how the reactions of elements are related to the arrangement of electrons in their atoms and hence to their atomic number. <p>5.1.2.4 Group 0</p>	<p>Key stage 3</p> <p>The Periodic Table</p> <ul style="list-style-type: none">• the varying physical and chemical properties of different elements• the principles underpinning the Mendeleev Periodic Table• the Periodic Table: periods and groups; metals and non-metals• how patterns in reactions can be predicted with reference to the Periodic Table• the properties of metals and non-metals• the chemical properties of metal and non-metal oxides with respect to acidity.
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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. The boiling points of the noble gases increase with increasing relative atomic mass (going down the group).

Students should be able to:

- explain how properties of the elements in Group 0 depend on the outer shell of electrons of the atoms
- predict properties from given trends down the group.

5.1.2.5 Group 1

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. Students should be able to describe the reactions of the first three alkali metals with oxygen, chlorine and water. In Group 1, the reactivity of the elements increases going down the group.

Students should be able to:

- explain how properties of the elements in Group 1 depend on the outer shell of electrons of the atoms
- predict properties from given trends down the group.

5.1.2.6 Group 7

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. Students should be

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able to describe the nature of the compounds formed when chlorine, bromine and iodine react with metals and non-metals. In Group 7, the further down the group an element is the higher its relative molecular mass, melting point and boiling point. In Group 7, the reactivity of the elements decreases going down the group. A more reactive halogen can displace a less reactive halogen from an aqueous solution of its salt.

Students should be able to:

- explain how properties of the elements in Group 7 depend on the outer shell of electrons of the atoms
- predict properties from given trends down the group.

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