



## What should I already know?

**Materials**

Different substances are made of different materials. Materials have different properties; some are harder than others, some are shinier and some are heavier.

Glass, for example, is a very different material from plastic or metal.

Give reasons, based on evidence from comparative and fair tests, for the use of everyday materials.

## What will I know by the end of the unit?

**The periodic table**

The chemist's dictionary is called the periodic table.

**Elements and compounds**

Atoms of elements combine to form compounds. These compounds have different properties to the elements they contain.

Compounds are named using chemical formulae. Chemical formulae show us which elements a compound contains and their relative proportions

**Using simple models**

Chemists can represent the building blocks of all materials using simple models and symbols.

Chemical models and symbols help us understand how elements join and react together to make new materials.

**Special materials**

Ceramics, polymers and composite materials have been in use for many thousands of years. Today, many new types of materials are being made, based on the chemistry of these earlier materials. These have exciting applications – such as in racing cars, rockets and modern buildings.

## Vocabulary

<b>Alkali metals</b>	<b>Group elements</b> , which all react quickly with water. Found on the far right side of the <b>periodic table</b>
<b>Atom</b>	The smallest particle of a chemical element that can exist. Contains protons neutrons and electrons.
<b>Atomic number</b>	The number of protons in an atom
<b>Cellulose</b>	Large sugar molecule made by plants for cell walls
<b>Ceramic</b>	An inorganic, non-metallic solid prepared by heating and then cooling substances such as clay
<b>Chemical formula</b>	chemical symbols and numbers that show which elements, and how many atoms of each, a compound is made up of
<b>Chemical properties</b>	The way that elements and compounds react with other elements and compounds
<b>Composites</b>	Materials made from two or more different materials, each of these often having very different properties
<b>compound</b>	Composed of two or more different elements chemically bonded together.
<b>Density</b>	Mass of a material per unit volume
<b>Electron</b>	A sub atomic particle with a negative charge
<b>Element</b>	An <b>element</b> is a substance made up of only one type of <b>atom</b> . When 2 or more elements are joined together they create <b>molecules</b> When 2 or more different elements combine they make <b>compounds</b>



<b>Group</b>	The vertical groups of elements in the periodic table
<b>Halogens</b>	The Group 7 elements are known as the halogens. They are reactive non-metals and are always found in compounds with other elements. Chlorine, bromine and iodine are all halogens that includes chlorine; group 17
<b>Melting point</b>	Temperature at which a solid changes state to a liquid
<b>Metal</b>	An element that forms a positive ion. Found on the right hand side of the <b>periodic table</b>
<b>Molecule</b>	Any time two or more atoms join together, they make a molecule.
<b>Neutron</b>	A sub atomic particle with a neutral charge
<b>Noble gas</b>	The group 0 elements, the noble gases, are all unreactive non-metal gases. They show trends in their physical properties. Their uses depend on their inertness, low density and non-flammability.
<b>Non-metal</b>	An element which forms a negative ion
<b>Period</b>	The horizontal groups of elements in the periodic table
<b>Periodic table</b>	Is a table of the chemical elements by increasing atomic number which displays the elements so that one may see trends in their properties.
<b>Physical properties</b>	<b>Properties that can be measured or observed without changing the chemical nature of the substance.</b> Some examples of physical properties are: colour (intensive) density (intensive) volume (extensive)
<b>Product</b>	(of chemical reaction) substance made in a chemical reaction
<b>Proton</b>	A sub atomic particle with a positive charge
<b>Polythene</b>	Polythene or polyethylene, the most common plastic, which is used for carrier bags
<b>Reactant</b>	Starting substance in a chemical reaction
<b>Reactivity Series</b>	A table which ranks metals on relative reactivity
<b>Starch</b>	Large molecule made by plants as a form of food storage
<b>Toxic</b>	Poisonous

## Useful Websites

<https://www.bbc.co.uk/bitesize/guides/z84wjxs/revision/1>  
<https://www.educationquizzes.com/ks3/science/atoms-and-elements-01/>  
<https://www.bbc.co.uk/bitesize/guides/zt2hqv4/revision/3>

Periodic table

<http://www.rsc.org/periodic-table>

<https://www.bbc.co.uk/bitesize/guides/z84wjxs/revision/1>

Halogens

<https://www.bbc.co.uk/bitesize/guides/ztq6cwv/revision/1>

Noble gases

<https://www.bbc.co.uk/bitesize/guides/zy6cfcw/revision/1>

Atomic symbol quiz let

<https://quizlet.com/12707171/atomic-symbols-flash-cards/>

Atoms Elements ,and compounds

<https://www.bbc.co.uk/bitesize/guides/zt2hqv4/revision/3>

Polymers

<https://www.youtube.com/watch?v=FD4dncoxXRY>



<https://study.com/academy/lesson/polymers-lesson-for-kids-definition-facts.html>

Diagram	Key information																																
<p>The diagram shows a simplified periodic table grid. Arrows on the left point to the rows, labeled 'Periods'. Arrows on the top point to the columns, labeled 'Groups'.</p>	<p><b>Elements</b></p> <ul style="list-style-type: none"> <li>• All 118 currently known elements are found on the periodic table.</li> <li>• All elements are given a symbol. These must be written with a capital letter first and a lower-case letter second. For example, Au is the symbol for gold. O is the symbol for Oxygen.</li> </ul>																																
<p>The diagram shows a simplified periodic table. The majority of elements are colored blue and labeled 'Metals'. The elements on the right side are colored red and labeled 'Non-metals'.</p>	<p><b>Groups and Periods</b></p> <p>Elements are arranged on the periodic table in groups and periods. Horizontal rows are called periods and vertical columns are called groups. Groups are labelled 1-7 from left to right, with last group being called either group 8 or 0. Elements in the same group have similar properties, because of this we can make predictions about the elements reactivity.</p>																																
<p>The diagram shows a simplified periodic table. The elements in the middle, between the metals and non-metals, are highlighted in yellow and labeled 'TRANSITION METALS'.</p>	<p><b>Metals and Non Metals</b></p> <p>Metals are found on the left hand side of the periodic table, the majority of elements are metals.</p> <ul style="list-style-type: none"> <li>• Properties of metals are, high density, high melting point (except mercury) and good conductors of heat and electricity.</li> <li>• Only three metals are magnetic (iron, cobalt and nickel).</li> </ul>																																
<p>Symbols to learn:</p> <table border="1"> <thead> <tr> <th>Symbol</th><th>Element</th></tr> </thead> <tbody> <tr><td>Mg</td><td>Magnesium</td></tr> <tr><td>Cl</td><td>Chlorine</td></tr> <tr><td>Ar</td><td>Argon</td></tr> <tr><td>Au</td><td>Gold</td></tr> <tr><td>Ag</td><td>Silver</td></tr> <tr><td>Cu</td><td>Copper</td></tr> <tr><td>Pb</td><td>Lead</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Symbol</th><th>Element</th></tr> </thead> <tbody> <tr><td>H</td><td>Hydrogen</td></tr> <tr><td>O</td><td>Oxygen</td></tr> <tr><td>N</td><td>Nitrogen</td></tr> <tr><td>He</td><td>Helium</td></tr> <tr><td>Fe</td><td>Iron</td></tr> <tr><td>S</td><td>Sulphur</td></tr> <tr><td>Na</td><td>Sodium</td></tr> </tbody> </table>	Symbol	Element	Mg	Magnesium	Cl	Chlorine	Ar	Argon	Au	Gold	Ag	Silver	Cu	Copper	Pb	Lead	Symbol	Element	H	Hydrogen	O	Oxygen	N	Nitrogen	He	Helium	Fe	Iron	S	Sulphur	Na	Sodium	<p><b>Structure of the Atom</b></p> <p>An atom is made up of three subatomic particles: protons, electrons and neutrons.</p> <p>Protons are in the nucleus and have a positive charge. Neutrons are in the nucleus and have no charge. Electrons are in the shells and have a negative charge. Protons and neutrons are the same size, where electrons have hardly any mass.</p> <ul style="list-style-type: none"> <li>• In an atom, there are equal numbers of protons and electrons because the positive and negative charges need to balance.</li> </ul>
Symbol	Element																																
Mg	Magnesium																																
Cl	Chlorine																																
Ar	Argon																																
Au	Gold																																
Ag	Silver																																
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He	Helium																																
Fe	Iron																																
S	Sulphur																																
Na	Sodium																																



The Group 7 **elements** are called the **halogens**. They are placed in the **vertical column**, second from the right, in the **periodic table**.

1	2											3	4	5	6	7	0	
										H								He
Li	Be											B	C	N	O	F	Ne	
Na	Mg											Al	Si	P	S	Cl	Ar	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
Fr	Ra	Ac																

#### Group 7 halogens

Chlorine, bromine and iodine are the three common Group 7 elements. Group 7 elements form salts when they react with metals. The term 'halogen' means 'salt former'.

#### Properties and uses of the halogens

This table summarises some of the properties and uses of three halogens:

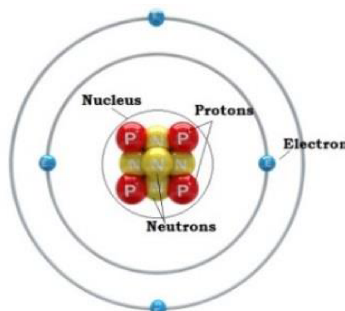
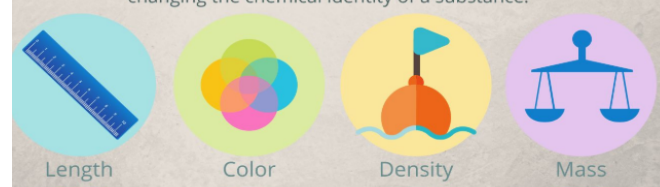
Element	Properties	Typical use
Chlorine	Green gas	Sterilising water
Bromine	Orange liquid	Making pesticides and plastics
Iodine	Grey solid	Sterilising wounds

### Chemical Properties



### Physical Properties of Matter

A physical property is a characteristic that can be determined without changing the chemical identity of a substance.



#### Physical properties of the noble gases

Group 0 contains **non-metal** **elements** placed in the **vertical column** on the far right of the **periodic table**. The elements in group 0 are called the **noble gases**. They exist as single **atoms**.

1	2											3	4	5	6	7	0		
		H																	He
Li	Be											B	C	N	O	F	Ne		
Na	Mg											Al	Si	P	S	Cl	Ar		
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn		
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og		

#### Noble gases

Group 0 is on the far right-hand side of the periodic table

The noble gases show trends in their **physical properties**.

#### Boiling points

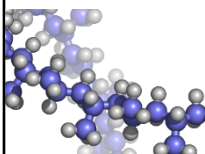
The noble gases all have low **boiling points**:

- helium, at the top of group 0, has the lowest boiling point of any element
- boiling point increases going down the group

### What are Polymers?

Have you ever heard the tale of *The Three Little Pigs*? This fable shows that building a house from bricks is far better than sticks or straw. If you look closely at a brick house, you'll see that each brick is uniform. They are layered in a repeated pattern to design that house. Bricks can be used to build many structures, from sidewalks to very large buildings. There are many structures found in nature or made by humans that are made in a similar way, like polymers.

**Polymers** are very big molecules made up of many smaller molecules layered together in a repeating pattern. In fact, the word *polymer* is Greek for 'many parts.' The smaller molecules that come together to form polymers are called **monomers**--small units that link together over and over to form a large polymer. Think of monomers like paper clips that link together to form a chain, and the chain is a polymer.



*Polymers are made of many monomers linked together.*

**Topic: Matter. Periodic table and Elements****Year: 8****NC Strand: Chemistry**

Polymers can result in some very unique materials, both naturally occurring and man-made. Let's explore some examples of man-made and natural polymers.