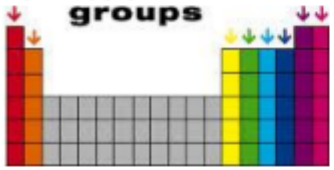
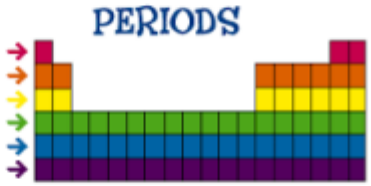
Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 2: Atomic Structure

Elements

- An ***element*** contains only one type of atom. All elements are given a symbol and are found on the periodic table. You need to learn the symbols for the first 20.
- The Periodic Table is arranged into groups (columns) and periods (rows), as shown below.





Elements in the same group have:

- The same number of electrons in their outer shell
- Similar properties

Elements in the same period have:

- The same number of electron shells

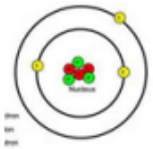
Compounds

- Compounds are 2 or more elements that are chemically bonded
- These are made in chemical reactions.
- Compounds are given a formula for example carbon dioxide is CO_2 means 1 carbon atom and 2 oxygen atoms.
- Another example is calcium hydroxide $Ca(OH)_2$ which means 1 calcium, 2 oxygen atoms and 2 hydrogen atoms

The structure of the Atom

- All matter is made from atoms. Atoms are very small. The radius of atom is about $1x10^{-10}$ m (this is also known as 0.1 nanometres).
- The central part of the atom is known as the nucleus. It is only $1x10^{-14}$m across, which is 10,000 times smaller than the total atom.
- An atom is made up of three subatomic particles: **protons**, **electrons** and **neutrons**.
- Protons and neutrons are found in the nucleus
- Electrons are found orbiting the nucleus in shells (also known as *energy levels*).

Proton
Neutron
Electron



- The mass and charges of the sub atomic particles is shown below:

	Mass	Charge
Proton	1	+1
Neutron	1	0
Electron	0	-1

- Atoms have **no overall charge** because they have the same number of positive protons as negative electrons.

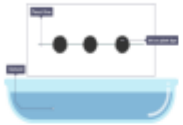
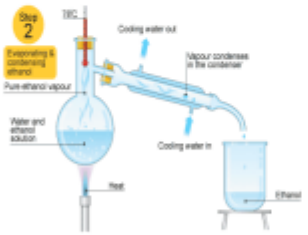
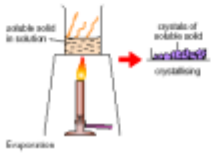
Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 3: Mixtures

Pure and Impure Substances

- A pure substance contains only <u>one</u> type of **element** or **compound.**
- **An impure substance** contains more than one type of element or compound in a mixture, for example salt water contains NaCl and H_2O. All mixtures are impure substances.
- Mixtures are much easier to separate than elements or compounds as they are not chemically bonded
- There are a variety of ways that mixtures can be separated and they are outlined below. Remember that these are all physical changes and chemical bonds are not broken during any of these processes.

Separating Impure Substance

Name	Diagram	Explanation
Chromatography		• Different substances travel different distances up the paper depending on their solubility in the solvent used (it is often water but not always). The more soluble, the further it moves up the paper • Line must be drawn with pencil because pencil will not run. • Artificial colours in foods can be identified using chromatography. Additives do not necessarily have a colour and therefore are identified using chemical analysis.
Distillation		• **Distillation is** when two liquids with *different boiling points* are separated • For example ethanol (alcohol) boils at 78 °C and water boils at 100 °C • If you heat a mixture of water and ethanol to 80°C the ethanol will **evaporate** but the water will not. • You then **condense** the ethanol and collect the pure ethanol
Crystallisation		• Crystallisation is when a solvent is evaporated from a solute.

Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 3: Metals

Properties of Metals

Metals are **good conductors of electricity**, due to the delocalised electrons, which can carry the electric charge. Metals are also **good conductors of heat** as the free electrons can transfer the heat energy through the metal.

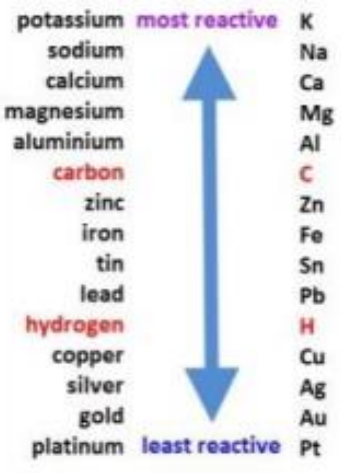
Metals are also **malleable** (bendy) as the layers of ions can easily slide over one another. This means that many pure metals are too soft for uses such as building.

Alloys

Alloys are mixtures of **2 or more elements, one of which is a metal.** Examples of alloys include brass and steel. Metals are alloyed so that the regular structure of metals is changed and the layers of ions can no longer slide over one another; therefore making it much stronger.

Reactivity of metals

When a metal reacts it **forms a positive ion.** The easier it is for a metal to form a positive ion, the more reactive it is. This is shown in the reactivity series; you should memorise the position of different elements:



Extraction of Metals

A metal ore is a compound found in rock, dug out of the ground, that contains enough metal that it is **economical** to extract it. For example, magnesium oxide. In order for us to use the magnesium we need to **extract** it from the oxide.
Metals more reactive than carbon are extracted from their ore using **electrolysis**.
Metals which are less reactive than carbon are extracted from their ore using **reduction** (by adding carbon). Reduction is the removal of oxygen as seen in the example.

Example: Iron Oxide + Carbon → Iron + Carbon Dioxide

The least reactive metals such as gold and silver are found on their own—they do not form a compound. This means they do not need to be extracted from their ore.

Science – Alternative curriculum
Support and application

Year 9
Term 3

Vocabulary	Wider Research	Apply
1. **Periodic table** 2. **Groups** 3. **Periods** 4. **Element** 5. **Proton** 6. **Neutron** 7. **Electron** 8. **Subatomic** 9. **Nucleus** 10. **Compound** 11. **Mixture** 12. **Pure** 13. **Impure** 14. **Chromatography** 15. **Distillation** 16. **Crystallisation** 17. **Conductor** 18. **Malleable** 19. **Alloy** 20. **Metal Ore** 21. **Reactivity series**	Atoms, elements and compounds https://www.bbc.co.uk/bitesize/guides/zt2hpv4/revision/1 Periodic table https://www.bbc.co.uk/bitesize/guides/zg923k7/revision/2 Mixtures https://www.bbc.co.uk/bitesize/guides/zgvc4wx/revision/1 Metals https://www.bbc.co.uk/bitesize/guides/zqwmxnb/revision/4	1. Create a poster for a classroom display that gives information about atoms and the periodic table 2. Research how to make pure salt form a substance called rock salt 3. How is distillation used to make sea water safe to drink 4. How is iron extracted from iron ore and what are the environmental impact of iron extraction