

# Edexcel core science Unit C1a

*Items in **bold** are for higher tier only*

## Topic 5 — Patterns in Properties

### Some facts:

- There are a large number of elements that combine to make a much larger number of compounds.
- There is a pattern to all the information about these elements and compounds, which allows chemists to make use of the information and data.
- Patterns and trends exist in the periodic table predictions can be made about the properties of elements and compounds.
- All chemical elements are made up of atoms which consist of nuclei and electrons.
- Different elements have different properties related to their position in the periodic table.
- Atoms join together to form molecules and compounds.
- The names of simple chemical compounds can be predicted from their formulae.

### Have you ever wondered?

- How can forensic scientists identify traces of substance at a crime scene?
- Is the periodic table really a map of what you're made of?
- Why are 'chemical' formulae such as 'J2O' and 'O2' so good for advertising?
- If potassium is like sodium, can you put potassium chloride on your chips?
- Can chemists turn cheap metal into gold?
- Which combination of chemicals makes the most violent explosion?
- Why is chlorine so good at protecting you from other people's bugs in a swimming pool?
- What chemicals do they use in laser light shows?

### Glossary

alkali, metal, elements, inert, positive, analytical, endothermic, molecules, precipitation, atomic-number, exothermic, negative, proton, atoms, flame test, neutral solution, compound, formula neutron, symbol, diatomic molecule, group, noble gas, transition metal, electron, halogen, period

### Know this:

- recall the formulae of elements and simple compounds in the topic
- represent chemical reactions by word equations **and simple balanced equations and use state symbols (s), (l), (g) and (aq)**
- **write balanced equations to describe and explain a wide range of reactions.**
- recall and explain how to use flame tests to identify metals in compounds
- use given analytical data to identify substances covered in this topic area, eg crime scene analysis
- interpret data to describe the properties of chlorine, iodine, helium, neon, argon, iron, copper, silver and gold and explain their uses
- interpret data of the colours formed by transition metal compounds reacting with sodium hydroxide solution to identify iron, copper and zinc in these compounds
- use the periodic table to find the symbol of an element
- identify and recall the position of metals and non-metals in the periodic table
- locate the positions in the periodic table of: alkali metals, halogens, noble gases, transition metals
- recall that elements with similar properties appear in the same vertical column (group) in the periodic table
- using secondary data, explore why elements are arranged in rows (periods) and columns (groups) in the periodic table

- explain that atoms consist of protons (positively charged) and neutrons (no charge) in a nucleus surrounded by electrons (negatively charged)
- demonstrate understanding that the periodic table is an example of how a scientific theory can predict the possible existence and properties of new elements
- **use secondary data to explore how the periodic table was devised and how the idea of atomic number developed**
- explain that all atoms of the same element have the same number of protons in their nuclei and demonstrate understanding that the atomic number of an element is unique to that element and is the number of protons in the nucleus of an atom of that element
- recall the variations in reactivity of the alkali metals with increasing atomic number, as shown by their reactivity with water
- recall that chemical reactions happen at different rates
- recall that some chemical reactions give out heat (exothermic) and some take in heat (endothermic)
- recall that, within a group in the periodic table, there is usually a gradual change in properties of the elements with increasing atomic number
- recall the variation in colour, physical states at room temperature and boiling points of the halogens with increasing atomic number
- describe the variation in reactivity of the halogens with increasing atomic number, as shown by displacement reactions when the halogens react with solutions of the other halides
- describe the noble gases as chemically unreactive compared with other elements
- explain that elements in the same group of the periodic table have similar chemical properties, as exemplified by the halogens
- **explain the use of the endings –ide and –ate in the names of common chemical compounds.**

## Topic 6 — Making Changes

### Have you ever wondered?

- How do you make a firework?
- Did people always have metals?
- Could you tell the difference between ice cream made with artificial vanilla and natural vanilla?
- Are artificial sweeteners good for you?
- How can sweeteners taste like sugar but have no ‘calories’?
- How do the bubbles, that make cakes so light, actually get there?
- Can you get cancer from eating too many food additives?
- How do you collect and test gases?

### Some facts:

- Similar elements or compounds react in similar ways.
- Predictions can be made about the products of reactions, based on knowledge of similar situations.
- Addition of oxygen to a substance is oxidation and loss of oxygen from a substance is reduction.
- Extraction of metals depends on their reactivity.

### Glossary

Carbohydrate, dehydration, oxidation, caustic soda, dilute, precipitate, citric acid, hydration, Salt, combustion, insoluble salt, soluble salt, decomposition, neutralization, thermal decomposition

### Know this:

- recall the formulae of elements and simple compounds in the topic
- represent chemical reactions by word equations **and simple balanced equations and use state symbols (s), (l), (g) and (aq)**
- **write balanced equations to describe and explain a wide range of reactions.**
- describe how neutralisation can be used to make salts, some of which may be used in fertilisers, and as colouring agents in fireworks
- describe the reactions of dilute hydrochloric and sulphuric acids with metal oxides, carbonates and hydroxides
- describe the preparation of pure, dry samples of insoluble salts from solutions of soluble salts
- explain that most metals have to be extracted from their ores, which are found in the Earth’s crust
- explain that some metals occur as their oxides and can be extracted by using carbon, eg iron, copper and lead
- explain that when a substance combines with oxygen oxidation occurs, eg the formation of magnesium oxide from magnesium and oxygen
- explain that when oxygen is removed from a substance reduction occurs, eg the formation of copper from copper oxide
- recall that the least reactive metals are found uncombined in the Earth’s crust
- relate the order of reactivity of metals to the stability of their ores and the method used for their extraction
- discuss the differences between ‘natural’ and ‘artificial’ substances, including whether they can be distinguished or are chemically different, and any impacts on health
- recall that baking powder contains sodium hydrogencarbonate and an acidic substance, and describe how during cooking these compounds react to produce carbon dioxide
- recall that when carbonates and hydrogencarbonates are heated they release carbon dioxide gas and that this is called thermal decomposition
- describe the processes of hydration and dehydration
- recognise cooking processes as chemical changes leading to new products

- **interpret data linking a chemical in food with a health impact, recognising that a correlation does not imply a cause**
- know how to test for the gases: hydrogen, oxygen, carbon dioxide, ammonia, chlorine
- know how to collect gases produced in reactions by upward and downward delivery, over water and using a gas syringe and relate this to the solubility and density of the gas
- describe the use of hazard labels in the chemistry laboratory
- investigate and identify the uses of the following common compounds: ammonia, carbohydrates, carbon dioxide, caustic soda, citric acid, ethanoic (acetic) acid, hydrochloric acid, phosphoric acid, sodium chloride (common table salt), water.