

While you were away

Lesson 1 Atoms, elements, compounds

1. what is an element?
2. What is a compound?
3. What is an isotope?

Lesson 2: Balancing equations

1. Write the word equation for the reaction of magnesium with oxygen
2. Write the balanced symbol equation

Lesson 3: Separating techniques

1. What is a mixture?
2. Name three different separating techniques
3. When would we use filtration?

Lesson 4: History of the atom

1. Who created the first model of the atom?
2. What did Rutherford discover?

Lesson 5: Atomic structure

1. What particles are found in the nucleus of an atom?
2. What particles orbit the nucleus of an atom?

Lesson 6: Size and mass of atoms

1. What is the atomic number?
2. What is the mass number?

Lesson 7: Relative formula mass

1. What is the relative formula mass of a compound?

Lesson 8: States of matter

1. Name the three states of matter
2. What is the state symbol for an aqueous solution?

Lesson 9: The Periodic table

1. Where are the metals on the periodic table?
2. The columns are called groups, what are the rows called?

Lesson 10: Development of the periodic table

1. How did Dimitri Mendeleev order the periodic table?
2. Why did he leave gaps?
3. How is the modern periodic table ordered?

Lesson 11: metals and non-metals

1. Name 3 metals on the periodic table
2. State 3 properties of metals

Lesson 12: Electron configuration

1. How are electrons arranged in the atom?
2. Why do atoms have no charge?
3. What is the charge on an electron?

Lesson 13: Formation of ions

1. What is an ion?
2. How are ions formed?
3. Why do metals form positive ions?

SUBJECT: Science

UNIT: Fundamentals: Materials



Atoms

Contained in the **nucleus are protons and neutrons**. Moving around the nucleus are the electron shells containing the electrons. They are negatively charged. Electrons are arranged with 2 electrons on the 1st shell, 8 on the second shell and 8 on the third. Overall, atoms have no charge; they have the same number of (positive) protons to (negative) electrons.

Ambitious Vocabulary

Chromatography,
isotope, atomic radius,
Distillation, condensing

Elements

Elements are made of atoms with the same atomic number. Atoms can be represented by symbols.

N₂ – Nitrogen, F – Fluorine. O₂ – Oxygen S₈ – sulphur

Isotopes – An isotope is an element with the same **number of protons, but a different number of neutrons**. They have the same atomic number but different mass number.
1H 2H 3H.

Compounds – A compound is when two or more elements are chemically joined.
e.g. CO₂, NaCl, HCl

Relative formula Mass

The relative formula mass is the sum of all the relative atomic masses of the atoms in the formula.

E.g.
HCl
H = 1 Cl = 35.5
So 1 + 35.5 = 36.5

H₂SO₄
H = 1, S = 32 O = 16
(1x2) + 32 + (16x4)
= 98

Formation of Ions

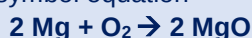
Ions are charged particles. They can be either negatively or positively charged and are made when elements lose or gain electrons. Metals lose electrons to become positively charged. Non-metals gain electrons to become negatively charged.

Chemical equations –

A chemical equation can be shown by using a word equation

Magnesium + oxygen → Magnesium Oxide.

Also a symbol equation



To balance equations there must be the same number of atoms on both sides of the equation.

Equations and Maths

To Calculate the relative atomic mass, use the following equation

$$\text{RAM} = \frac{\text{sum of (isotope abundance} \times \text{isotope mass number)}}{\text{Sum of abundances of all isotopes}}$$

Particles in solids, liquids, and gases

Solids – regular arrangement, particles close together in fixed position, strong forces, low energy and can only vibrate.

Liquids – irregular arrangement, close together, free to move, weaker forces, more energy.

Gases – irregular arrangement, particles separate, very weak forces, lots of energy, move randomly.

Size and mass of atoms

The atomic number and the mass of an atom is displayed on the periodic table. The atomic number is the number of protons in an atom. The mass number is the mass of the protons and neutrons in the nucleus

Development of the periodic table.

Dimitri Mendeleev period table was ordered by atomic mass. He left gaps to show that he believed there was some undiscovered elements.

The **modern periodic table** Elements are ordered by proton number. It has metals on the left and non-metals on the right. It is ordered in groups and periods.

Mixtures, Chromatography and Separation

Mixtures – in a mixture there are no chemical bonds, so the elements are easy to separate. Examples of mixtures are air and salt water.

Chromatography – To separate out mixtures of two liquids with different solubility.

Filtration – To separate solids from liquids.

Evaporation – to separate a soluble salt from a solution. A quick way of separating out salt from water.

Crystallisation – To separate a soluble salt from a solution, a slower method of separating out salt.

Distillation – Separating a mixture of liquids with two boiling points by evaporating one liquid and then condensing it.

Fractional distillation – Separating out a mixture of liquids with multiple boiling points (crude oil).

State Symbols

The three states of matter are represented as symbols: solid (s), liquid (l), gas (g), aqueous (aq). Aqueous solutions are formed when a substance is dissolved in water.

History of the atom

Scientist	date	Discovery
John Dalton	Start of 19 th Century	Atoms were first described as solid spheres
JJ Thomson	1897	Plum pudding model – the atom is a ball of charge with electrons scattered
Earnest Rutherford	1909	Alpha scattering experiment – mass concentrated at the centre; the nucleus is charged, Most of the mass is in the nucleus. Most atoms are empty space.
Niels Bohr	1911	Electrons are in shells orbiting the nucleus
James Chadwick	1940	Discovered that there are neutrons in the nucleus.