

Exercise walk-through

1.1

Atoms, elements, compounds and mixtures (4.1.1.1–4.1.1.4)

AQA · GCSE · Chemistry

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The method

Method — Worked example

Atom – the smallest part of an element that can exist. **Element** – one type of atom, with a chemical symbol. **Compound** – two or more elements chemically combined in **fixed proportions**; only chemical reactions separate it. **Mixture** – substances not chemically combined; each keeps its properties.

Method — Worked example

Separation	Separates
filtration	insoluble solid from liquid
crystallisation	dissolved solid from solution
simple distillation	liquid from a dissolved solid
fractional distillation	liquids with different boiling points
chromatography	soluble substances in a mixture

Exercises 2.1·2.3

2.1 An atom has atomic number 17 and mass number 37. Give the numbers of protons, neutrons and electrons. [3]

2.2 Name the separation method for: (a) sand from water; (b) ethanol from water. [2]

2.3 State two differences between a compound and a mixture. [2]

Exercises 2.1·2.3

2.1 An atom has atomic number 17 and mass number 37. Give the numbers of protons, neutrons and electrons. [3]

2.1 17 protons; $37 - 17 = 20$ neutrons; 17 electrons.

2.2 Name the separation method for: (a) sand from water; (b) ethanol from water. [2]

2.2 (a) Filtration; (b) fractional distillation – different boiling points.

2.3 State two differences between a compound and a mixture. [2]

2.3 A compound has its elements chemically combined in fixed proportions; a mixture's substances are not combined and keep their own properties. A compound needs a chemical reaction to separate; a mixture separates by physical processes.

Exercises 3.1-3.3

3.1 Describe how the model of the atom changed after the alpha particle scattering experiment, and give two conclusions from that experiment. [5]

3.2 Magnesium has isotopes 24 (79 %) and 26 (21 %). Calculate its relative atomic mass. [3]

3.3 A mixture contains salt, sand and water. Plan how to obtain pure, dry salt. [5]

Exercises 3.1·3.3

3.1 Describe how the model of the atom changed after the alpha particle scattering experiment, and give two conclusions from that experiment. [5]

3.1 The plum pudding model was replaced by the nuclear model: most of the mass and all positive charge concentrated in a tiny nucleus at the centre; most of the atom is empty space, since most alpha particles passed straight through; the few deflected showed the nucleus repelled positive charges.

3.2 Magnesium has isotopes 24 (79 %) and 26 (21 %). Calculate its relative atomic mass. [3]

3.2 $\text{Ar} = (24 \times 79 + 26 \times 21) \div 100 = (1896 + 546) \div 100 = 2442 \div 100 = 24.42$.

3.3 A mixture contains salt, sand and water. Plan how to obtain pure, dry salt. [5]

3.3 Add water and stir to dissolve the salt; filter – the sand is insoluble and stays on the paper; the filtrate is salt solution; evaporate most of the water, then leave to crystallise; dry the crystals on filter paper/in a warm oven.