

ATOMIC STRUCTURE – TABLE OF CONTENTS

Specification

▼ AQA: 4.1.1.1

- use the names and symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements in this specification
- write word equations for the reactions in this specification
- write formulae and balanced chemical equations for the reactions in this specification.
- (HT) write balanced half equations and ionic equations where appropriate.

► Edexcel: 1.18 | 1.19 | 1.25 | 1.25 | 1.28
► Cambridge: 2.2.6 | 3.2.2 | 3.3.3 (E) | 8.1.1 | 8.1.4

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🧠 Knowledge and Comprehension

Identify and describe the key knowledge for Atoms, elements and compounds, including the names and symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements in this specification; compounds of these elements from given formulae or symbol equations.

🧠 Comprehension and Application

Explain and apply the principles of Atoms, elements and comp....

🧠 Application and Analysis

Analyse Atoms, elements and compounds in unfamiliar contexts....

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Exam Focus – RAM



Relative Atomic Mass: From Definition to Calculation

Supporting Material

+ Why We Use Relative Atomic Mass

+ Defining Relative Atomic Mass

ATOMIC STRUCTURE – TABLE OF CONTENTS

- Atoms, Elements And Compounds
- Mixtures
- The Development Of The Model Of The Atom
- Relative Electrical Charges Of Subatomic Particles
- Size And Mass Of Atoms
- Relative Atomic Mass
- Electronic Structure

- Sodium has an atomic number of 11, giving it an electron arrangement of 2, 8, 1
- ▼ The atomic number of an element tells you both the number of protons and the number of electrons in a neutral atom
- ▼ The first electron shell can hold a maximum of 2 electrons
- ▼ When fluorine gains one electron, it forms a fluoride ion with a charge of 1-



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- write formulae and balanced chemical equations for the reactions in this specification.
- (HT) write balanced half equations and ionic equations where appropriate.

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Atoms, Elements & Isotopes: Cracking the Periodic Table

Print Cornell Revision Notes

Knowledge and Comprehension

Identify and describe the key knowledge for Atoms, elements ...

Comprehension and Application

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Chemical Formulae

What is the ratio of atoms in each compound?

calcium carbonate (CaCO_3)

Ca



one zinc atom

C



O₃



one boron atom

two boron atoms

one sulfur atom

four oxygen atoms

one sodium atom

two sodium atoms

one chlorine atom

two chlorine atoms

next



- Chemical formulae use element symbols and subscript numbers to show how many atoms of each element are in a molecule, e.g.
- H_2O means two hydrogen atoms and one oxygen atom.
- If only one atom of an element is present, no subscript number is written, as seen with the single carbon in CO_2 .
- A more complex example is H_2SO_4 (sulfuric acid), which contains two hydrogen atoms, one sulfur atom, and four oxygen atoms.
- Brackets in formulae group atoms together, and the number outside the bracket shows how many of those groups are present, e.g.
- $\text{Ca}(\text{OH})_2$ means one calcium and two groups of OH.



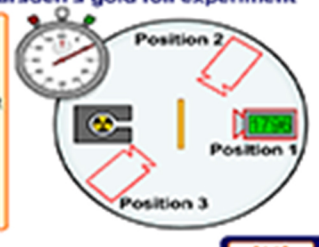
Inspiring Curiosity Through Scientific Exploration

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Rutherford's Gold Foil Experiment (1909)

Geiger and Marsden's gold foil experiment

2. Experiment
Move the detector to one of the three positions, then click "test" to begin. Repeat for each position.
Will radiation be detected at all three positions? Which position will detect most radiation?

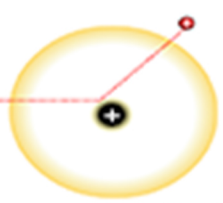


- Ernest Rutherford and his students fired positively charged alpha particles at a thin sheet of gold foil, expecting them to pass straight through if Thomson's model were correct.
- Surprisingly, some alpha particles were deflected sideways and a small number bounced directly back, disproving the plum pudding model.
- Rutherford proposed the nuclear model, suggesting that all positive charge is concentrated in a small, dense nucleus at the centre of the atom, surrounded by a cloud of negative electrons.

The Flaw in Rutherford's Nuclear Model

How did Rutherford explain the gold foil experiment?

When a positively-charged alpha particle headed **directly towards** a positive gold nucleus, it was also **repelled**. In this case, the alpha particle **bounced back** off the foil and travelled back towards the source.



Interactive practical activities enable learners to investigate scientific phenomena that may be difficult to experience within a traditional classroom. Carefully sequenced explanations, visual observations and learner-controlled exploration provide a safe environment in which students can develop investigative skills, **connect theory with practice** and deepen their understanding of chemistry through active scientific enquiry.

Scientific Enquiry • Experiential Learning • Inquiry-Based Learning