Atoms, ions and isotopes

AQA 8462 Separate Chemistry · Foundation and Higher

Answer on your own paper. Show your working where needed.

1. Charge and position

Name the three particles in an atom. For each particle, give its relative charge and say whether it is in the nucleus or outside it.

2. Count the particles

A neutral sulfur atom has atomic number 16 and mass number 34. Find its numbers of protons, neutrons and electrons.

3. Draw the shells

A neutral aluminium atom has atomic number 13. Write its electronic configuration in numbers, then draw it using electron shells.

4. An oxide ion

Oxygen has atomic number 8. Give the numbers of protons, neutrons and electrons in an O^{2-} ion with mass number 16. Explain how it acquired its charge.

5. Spot the isotopes

Atom P has 17 protons and 18 neutrons. Atom Q has 17 protons and 20 neutrons. Atom R has 18 protons and 20 neutrons. Which pair are isotopes of the same element? Explain.

6. Gold foil evidence

Most alpha particles passed straight through thin gold foil. Very few were scattered through large angles. Give one conclusion about atomic structure supported by each observation.

7. Relative atomic mass

In a magnesium sample, 80% of the atoms have relative isotopic mass 24, 10% have mass 25 and 10% have mass 26. Calculate the relative atomic mass of magnesium in this sample.

8. Compare two samples

Sample A of bromine contains 60% bromine-79 and 40% bromine-81. Sample B contains 40% bromine-79 and 60% bromine-81.

Calculate the relative atomic mass in each sample. Explain how the abundances account for the difference. Use 79 and 81 for the relative isotopic masses.

9. Extra challenge · A proposed isotope ratio

Boron has isotopes of masses 10 and 11. One sample has relative atomic mass 10.8. A student says there are equal numbers of each isotope. Test the claim, then find the percentage of atoms with mass 11.

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