

# 1c - Atomic structure

## Edexcel IGCSE Chemistry Revision Notes

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### How to use these notes

These notes cover everything you need to know for this part of the specification. They have been written in question-answer format to make them easier for you to study from.

In order to study successfully, I recommend you do the following for each question and answer:

- Read it carefully and make sure you **understand** it.
- **Memorise** the answer.
- **Practice** applying your understanding to past exam questions.

A good way to memorise information is to use **retrieval practice**. This is when you practise retrieving information from your memory. You could do this by making a flashcard for each question with the question on one side and the answer on the other. Or you could use a flashcard app. Alternatively, use a sheet of paper to cover up the answer so you can only see the question. Try to answer the question and then check how you did.

You should practise retrieving each answer from your memory until you can do it perfectly. Even once you can retrieve the answer perfectly, your ability to retrieve it will probably fade as time passes without practising. Therefore you will need to keep going back to the questions that you have previously mastered and practising them again. However, each time you re-learn the answer, the memory will be stronger and will last longer than the time before.

### 1.14

#### What is an atom?

An atom is the smallest part of an element that can exist.

#### What is a molecule?

A molecule is a particle made up of two or more atoms held together by covalent bonds.

## 1.15

### **What are subatomic particles?**

Subatomic particles are particles that are smaller than atoms.

### **Which three subatomic particles make up atoms?**

The three subatomic particles that make up atoms are protons, neutrons and electrons.

### **What are the relative masses of protons, neutrons and electrons?**

The relative masses of protons, neutrons and electrons are:

- Proton: 1
- Neutron: 1
- Electron: Negligible (so small that it can be thought of as 0).

### **What are the relative charges of protons, neutrons and electrons?**

The relative charges of protons, neutrons and electrons are:

- Proton: +1
- Neutron: 0
- Electron: -1

### **How are the protons, neutrons and electrons arranged in an atom?**

In an atom, the protons and neutrons are located together in a structure called the nucleus, which is found at the centre of the atom.

The electrons orbit around the nucleus in shells.

## 1.16

### **What is atomic number?**

Atomic number (also known as proton number) is the number of protons in the nucleus of an atom or ion. It is the atomic number of an atom or ion that determines which element it is.

### **What is mass number?**

Mass number (also known as nucleon number) is the total number of protons and neutrons in the nucleus of an atom or ion.

### **What are isotopes?**

Isotopes are atoms or ions which have the same number of protons as each other but different numbers of neutrons. In other words, they have the same atomic number but different mass numbers.

### **What is relative atomic mass?**

Relative atomic mass is the average relative mass of all of the atoms/ions in a sample of an element.

**Extra Explanation: Elements do not have mass numbers, atoms and ions do.**

If you look at the periodic table, you will see the atomic number and relative atomic mass listed for every element.

However, you will not see the mass number listed. This is because elements do not have mass numbers. For example, there is no mass number for oxygen. This is because multiple different isotopes exist for each element and each isotope has a different mass number.

Mass number is a property of an individual atom or ion. For example, an oxygen-15 atom or ion has a mass number of 15, whereas an oxygen-16 atom or ion has a mass number of 16.

If someone asks, 'what is the mass number of oxygen?', the only correct answer is, 'it depends on which isotope of oxygen we are talking about'.

## 1.17

### What is meant by the 'abundance' of a particular isotope of an element?

The abundance of a particular isotope of an element is the proportion of atoms and ions of the element that are that particular isotope.

**Isotope abundance example: Chlorine-35 and chlorine-37**

The two main isotopes of chlorine are chlorine-35 and chlorine-37.

Chlorine-35 has an abundance of about 76%.

Chlorine-37 has an abundance of about 24%.

This means that about 76% of chlorine atoms and ions are chlorine-35, and about 24% are chlorine-37.

### How do you calculate the relative atomic mass of an element from the abundances of its isotopes?

The relative atomic mass of an element is calculated using the equation below. However the equation needs to be adjusted depending on how many isotopes there are:

$$\text{Relative Atomic Mass} = \frac{\left( \begin{array}{c} \text{Isotope 1} \\ \text{Mass Number} \end{array} \times \begin{array}{c} \text{Isotope 1} \\ \text{Abundance} \end{array} \right) + \left( \begin{array}{c} \text{Isotope 2} \\ \text{Mass Number} \end{array} \times \begin{array}{c} \text{Isotope 2} \\ \text{Abundance} \end{array} \right) + \left( \begin{array}{c} \text{Isotope 3} \\ \text{Mass Number} \end{array} \times \begin{array}{c} \text{Isotope 3} \\ \text{Abundance} \end{array} \right)}{100}$$