

Atoms and electrons

Extract from “Advanced chemistry for you”, Lawrie RYAN, Nelson Thornes

1. Approche globale, vocabulaire :

Let’s read the text by your own and underline the words you do not understand. We will find synonyms or meanings.

- to put forward** = to suggest
- snooker balls** = billiards balls
- drew up (from draw up)** = write, state...
- to investigate** = to look for, to search, to explore
- to carry out experiments** = to lead experiments
- apparatus** = device
- overall** = global
- embedded in** = surrounded by

What does the document consist of?

- a text
- a chart with labels of elements
- a diagram of an experiment
- a diagram for a model of atoms

Who were the first scientists to study atoms?

- the Greeks *(in particular Democrite, Vth century BC)*
- John Dalton *(1766 – 1844)*
- Joseph John Thomson *(1856 – 1840)*

2. Analyse du texte:

Read the text again and fill in the table by writing the concept of each scientist about atoms:

Scientists	The Greeks	Dalton	Thomson
Concepts	<i>all matter is made up of particles which cannot be split up : the atoms.</i>	<i>all substances are combinations of atoms, looking like small snooker balls</i>	<i>atoms are neutral, but they contain much less massive particles than atoms themselves, called electrons. Electrons are negatively charged and they are embedded in a cloud of positive charge.</i>

Laisser du temps puis interroger les élèves pour remplir le tableau.

3. Analyse d’une animation (l’animation est muette et sans légende):

Look at this short animation and explain.

We see a statue. The statue is split up into pieces. The pieces become even smaller. The smallest piece of rock we can get is an atom.

What does the statue stand for? It is the thinker of RODIN.

Why a thinker? Because the Greeks were known as famous philosophers.

What is the message of this animation? If we try to cut the matter in even smaller pieces, we will finally reach a stage where we cannot cut farther: this is the stage of the atom.

4. Analyse d'un tableau :

Let's look at Dalton's chart.

What is it composed of? *It is composed of symbols, drawings, names and figures.*

What is the difference between the first and the second column?

In the first column, the symbols are only drawings whereas in the second one, we have letters.

Why? *Because there were not enough drawings to represent all the elements.*

What are the actual symbols and names for these elements?

hydrogen	nitrogen	carbon	oxygen	phosphorus	sulphur	magnesium	lime	soda	potash
H	N	C	O	P	S	Mg	CaO	NaOH	KOH
strontium	baryum	iron	zinc	copper	lead	silver	gold	platina	mercury
Sr	Ba	Fe	Zn	Cu	Pb	Ag	Au	Pt	Hg

Which substances did Dalton mistakenly label as elements and why?

Lime, soda and potash are not elements because they are composed of several atoms, they are compounds.

What could the numbers correspond to?

It could be the mass, the relative mass.

Compare with the periodic table of your textbook.

There are some mistakes too, but the order of size is correct.

5. Analyse d'une expérience (si on a le matériel, on peut aussi montrer un tube de Crookes):

Let's look at Thomson's experiment.

What is the apparatus composed of?

→ a tube with a gas at low pressure (not many molecules in it)

→ two electrodes: anode(+) and cathode(-)

→ high voltage (15 000 Volt)

What can we see in this experiment?

We can see a glow at the end of the tube.

What is this small light due to?

This light comes from the hit of a beam of particles.

How can we know that the particles are negatively charged?

Because they are attracted by the positive electrode and repelled by the negative one.

Where do these particles come from?

These particles must come from the atoms of gas.

What was Thomson's conclusion?

Atoms must have tiny negative particles. But as they are neutral, a positive charge must be spread over the rest of the atoms: that is the plum pudding model.

What does the pudding stand for? *It stands for the positive charge.*

What do the plums stand for? *They stand for the negative charges, the electrons.*