

**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, V<sup>th</sup> 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
<b>Concepts</b>	<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.*