

The historical models of the atom

The ancient Greeks were the first to think of the atom as the smallest unit of matter: Democritus suggested that everything was made up of very small particles which had different sizes and shapes depending on the material. He called these particles 'atoms', which in Greek meant 'uncuttable' as he thought that matter could not be split¹ into smaller parts.

In 1802, a British scientist named John Dalton revived² the theory of the atoms, which, in his view, were solid spheres stacked³ together.

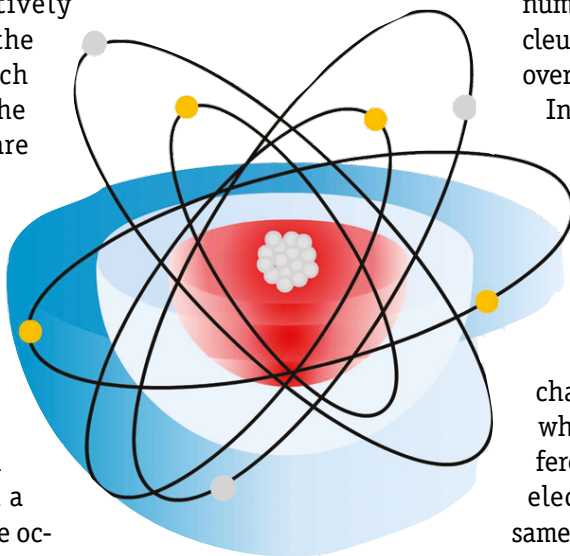
In 1897, the British physicist J.J. Thomson found out that the atom was, in turn, made up of smaller charged particles. Through experiments with a particular gas, called neon, he discovered a negatively charged particle - the electron - with a much smaller mass than the atom. Since atoms are neutral - that is they do not have a charge - Thomson reasoned that there must be a positive charge somewhere in the atom to balance the negative charge. He thus developed an atomic model, in which a sphere of positive charge oc-

cupied the entire volume of the atom with electrons embedded⁴ in it.

Later, in 1911, Ernest Rutherford discovered that the positively charged particles were concentrated in a very small volume inside the nucleus. Today these positively charged particles are called protons.

In 1913, after the discovery of the electron and the proton, Niels Bohr developed a model of the atom in which the electrons orbited around the nucleus, in a way similar to planets orbiting around the Sun. Electrons could jump from one orbit to another by emitting or absorbing energy. T

he total number of protons in an atom determines the electric charge of the atom. As the weight of an electron is almost zero, it is the number of protons in the nucleus which determines the overall⁵ mass of an atom.



In 1932, James Chadwick discovered this missing particle and called it neutron. The neutron is slightly⁶ heavier than the proton and carries no electric charge. This is the reason why some atoms have different masses even if their electric charges are the same.

GLOSSARY

- 1 divided
- 2 renewed
- 3 arranged
- 4 enclosed
- 5 total
- 6 not much

ACTIVITIES

- 1 Answer the following questions.
 - 1 Who were the first scientists to discover that matter consisted of small units?
 - 2 What does the word atom mean? Is this characteristic still confirmed by contemporary scientific theories?
 - 3 What did Thomson discover?
 - 4 Who discovered that protons were concentrated inside the nucleus?
 - 5 What was Bohr's model of the atom like?
 - 6 What does the electric charge of an atom depend on?
 - 7 Who discovered the neutron?
 - 8 What are the main features of the neutron?
- 2 Scan the text and find the English equivalents of the following Italian words.

1 Teoria
2 Scienziato
3 Particelle
4 Carica
5 Dividere