



JBSP Mandal's Art & Science College, Department Of Chemistry

TOPIC : Atoms and Periodic Table

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Atoms and the Periodic Table.

We can **classify** (arrange) elements in different ways:-

- **naturally occurring/made by scientists**



- **solid/liquid/gas**



- **metal/non-metal**



The Periodic Table of the Elements.

The Periodic Table lists the chemical elements in increasing atomic number.

The Periodic Table arranges elements with similar chemical properties in groups (vertical columns).

All the elements in a group have similar chemical properties as they have the same number of outer electrons.

The Periodic Table of the elements is a useful way of classifying the elements.

A vertical column of elements in the periodic table is called a group.

The elements in the same group of the periodic table have similar chemical properties.

The noble gases are a group of very unreactive elements.



Groups of elements have names: –

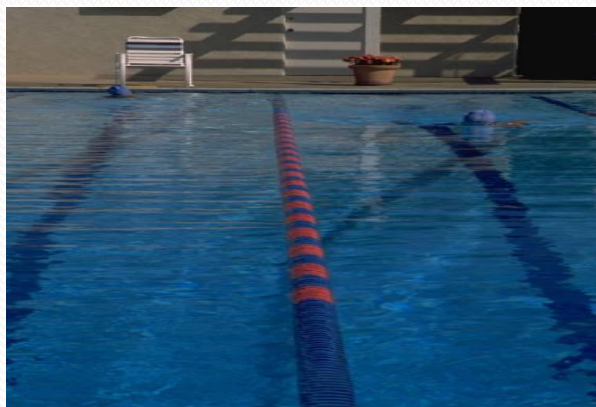
**Group 1 -
the alkali metals**



**Between groups 2 and 3 -
the transition metals**



**Group 7 -
the halogens**



**Group 0 -
the noble gases**

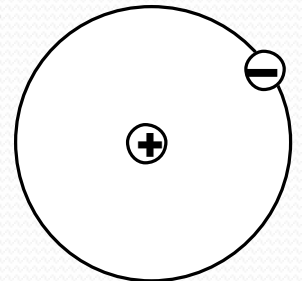


Every element is made up of very small particles called atoms.

Atoms of different elements have a different **number** called the **atomic number**.

Atoms have a very small, **positively charged**

nucleus, with negatively charged **electrons** outside the nucleus in **energy levels**.



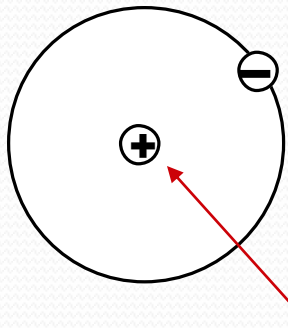
The **nucleus** of every atom (except hydrogen) contains **two** particles:-

- **Protons** (+ve charge / mass 1amu)
- **Neutrons** (no charge / mass 1amu)

In energy levels outside the nucleus we find

- **Electrons** (-ve charge / mass $\frac{1}{2000}$ amu)

Atoms are neutral because the **positive charge** of the **nucleus** is equal to all of the **negative charges** of the electrons added together.



- **11 electrons**
- **11 negative charges**
- **11 protons**
- **11 positive charges**

Atoms are neutral because the numbers of protons and electrons are equal - the opposite charges cancel.

Nuclide notation – how many protons, neutrons, and electrons in atoms?

Mass number

(protons + neutrons)

Atomic number

(number of protons)

number of neutrons

37 **Cl**

-17

20

As **atoms have no charge**, the number of **electrons is the same** as the number of **protons**. This atom has **17 electrons**.

Nuclide notation – how many protons, neutrons, and electrons in ions?

Mass number
(protons + neutrons)

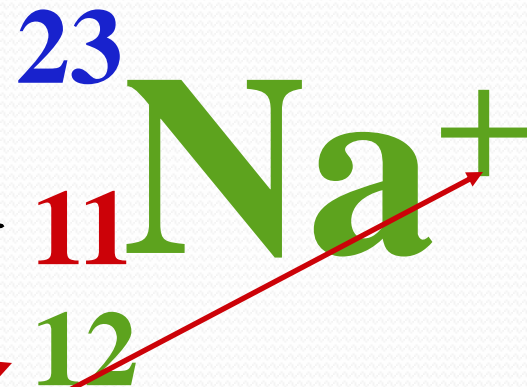
Atomic number
(number of protons)

number of neutrons

1+ charge means **1** electron

less than the number of protons.

This atom has 10 electrons.



Nuclide notation – how many protons, neutrons, and electrons in ions?

Mass number

(protons + neutrons)

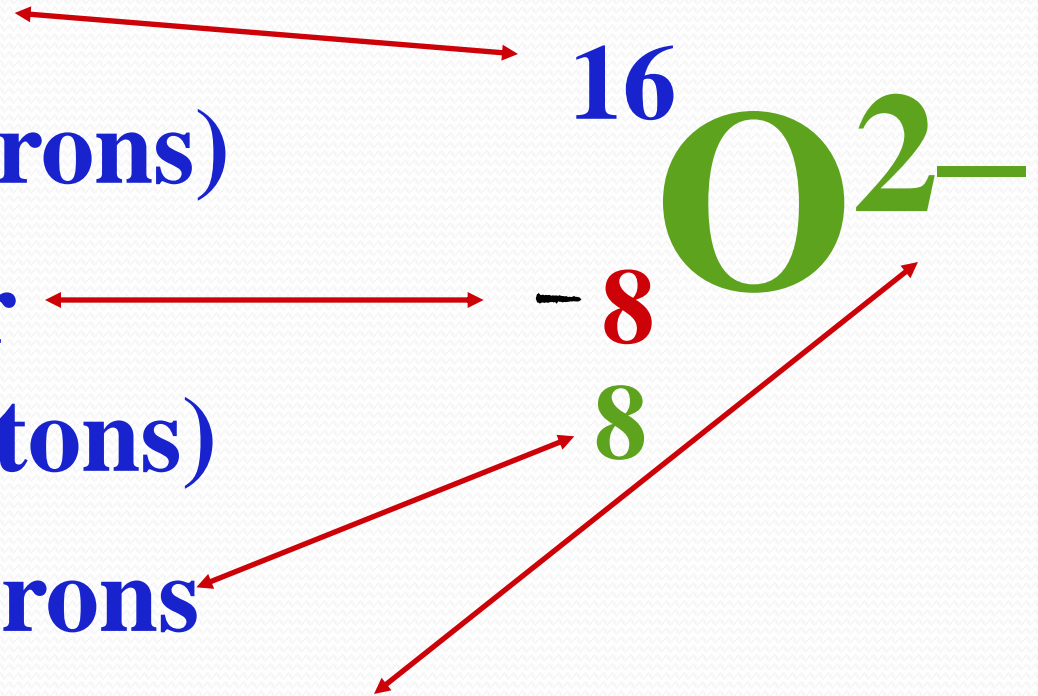
Atomic number

(number of protons)

number of neutrons

2- charge means **2**

electrons **more** than the number of protons. This atom has 10 electrons.



Isotopes.

Isotopes are:

atoms of the **same element**

which have **different mass numbers**

due to **different numbers of neutrons** in each nucleus.

Most elements exist as a **mixture of isotopes**,
e.g. chlorine has 2 isotopes



Relative atomic mass

The relative atomic mass of an element is the average mass of all the isotopes of that element.

The relative atomic mass of chlorine is 35.5.
Chlorine has 2 isotopes



so the isotope of mass 35 is present in the largest quantity.