

# Chemistry Basics Explained

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“Chemistry Basics Explained” is an article under ClearIAS.com guest contributor program started with a vision of polishing the writing skills of UPSC aspirants. ClearIAS.com at this juncture would like to congratulate all the contributors who participated in ClearIAS.com for “Write Articles; Win Prizes” contest for the month of Feb 2014. We got reasonably good response for the contest, but unfortunately most of the articles received were not meeting our quality guidelines and hence couldn’t be published. We have personally indicated the necessary corrections needed and UPSC requirements to many who sent articles, but all future contributors are advised to carefully go through the guidelines before sending articles. We may not be able to correct all mistakes individually. Prize for the winner in Feb 2014 [Deepesh S Rajan], will be send to the address mentioned in the mail. All aspirants are encouraged to keep writing and send articles to ClearIAS.com. The opportunity is open for the month of March 2014! Back to the topic as of now

## Chemistry Basics

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**Chemistry** is the study of the composition, structure, properties and change of matter [matter is defined as anything that has rest mass and volume (it takes up space) and is made up of particles]. Chemistry is chiefly concerned with atoms (a basic unit in chemistry) and their interactions with other atoms.

## Atoms

The atom is a basic unit of matter that consists of a central nucleus surrounded by negatively charged electrons. Nucleus contains protons and neutrons. Electrons revolve around the nucleus in different orbits.

## Subatomic particles

The constituent particles of an atom are called sub atomic particles. They mainly include protons, electrons and neutrons. The electron is the least massive of these particles at  $9.11 \times 10^{-31}$  kg with a negative charge. Protons have a positive charge and Neutrons have no electrical charge.

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*Discoveries:*

- Proton by Ernest Rutherford in 1918.
- Electron by J.J. Thomson in 1897.
- Neutron by James Chadwick in 1932.

## Nucleus

The central part of an atom is called nucleus. Particles present inside the nucleus are called nucleons and they include mainly protons and neutrons. Due to the presence of protons nucleus has positive charge.

## Molecules

Molecules are made from atoms of one or more elements. Some molecules are made only by one type of atoms (two oxygen atoms bond together to form O<sub>2</sub> molecule) while molecules like protein are made up of atoms from different elements.

## Elements

A chemical element is a pure chemical substance consisting of one type of atom distinguished by its atomic number. Carbon, Oxygen, Silicon, Arsenic, Aluminum, Iron, Copper, Gold, Mercury etc. are all examples of elements.

Note :

- Hydrogen and Helium are the most abundant elements in the universe.
- Iron is the most abundant element (by mass) in earth.
- Oxygen is the most common element in the earth's crust.
- The 8 most abundant elements in Earth's crust (by mass) are the following :

1. 46.6% Oxygen (O)
2. 27.7% Silicon (Si)
3. 8.1% Aluminum (Al)
4. 5.0% Iron (Fe)
5. 3.6% Calcium (Ca)
6. 2.8% Sodium (Na)
7. 2.6% Potassium (K)
8. 2.1% Magnesium (Mg)

## Periodic Table

Dmitri Ivanovich Mendeleev also he is the father of periodic table. The first detailed form of



Mixtures are combination of two or more substances, which when combined, each substance retains its own chemical identity. Examples of Mixtures include :

- sand and water.
- salt and water.
- sugar and salt.

