

Original Research Paper

# The Basic Elements of Life's

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**Abstract:** The four basic elements of life are: Oxygen, hydrogen, nitrogen and phosphorus. These four elements are found in abundance in both the human body and in animals. There are other elements that compose the human body, but the four we've highlighted participate in all life processes. Besides, these four elements make up ATP chains (molecule), which governs and controls the body entirely energy processes and physiological and pathological processes of the human body. Oxygen is the pivot, which produces water and air and it is indispensable to the life. Hydrogen participates with oxygen to produce water, without which life would not be possible. Nitrogen with oxygen constitutes basic elements of air that compose the Earth's atmosphere. Phosphorus is the last element of human energy chain. It is the fire and light. In other words, human energy chain consists of four basic elements, or three compounds: Water, air and fire (light). In genetics, all cellular energy processes are driven and controlled by ATP molecule type. If we consider the chain of human genes, account must also be taken of the element carbon. In this mode, the four elements of life become the five elements of life: Oxygen, hydrogen, nitrogen, phosphorus and carbon.

**Keywords:** Bioengineering, Biotechnologies, Biochemical Processes, Oxygen, Hydrogen, Nitrogen, Phosphorus, Carbon, Basic Elements, Life Basic Elements, Genetic Chain

## Introduction

Genetics (from the Greek *genos γεννώ*, "give birth") is the science that studies heredity and genes, is a biology sub-discipline. One of its branches, formal genetics, or Mendelian, is interested in the transmission of hereditary characteristics between sires and progeny. The invention of "genetic" term returns to the English biologist William Bateson (1861-1926), who uses it for the first time in 1905. Modern genetics is often dated to the detection of the double helix structure of DNA done by James Watson and Francis Crick in 1953. DNA was previously a concept which it had not demonstrated the existence of a real referent. Developmental genetics studies the molecular actors (and the genes that encode them) involved in the formation of the body from the fertilized egg cell stage. It particularly focuses on the development of bilateral symmetry and mechanisms to move from a simple biological system (unicellular, radial symmetry) in a complex organism (multicellular,

often Metamerism and built specialized bodies). She often uses models to study species of the organism formation mechanisms (*Drosophila*, the nematode *Caenorhabditis elegans*, zebrafish, a plant of the genus *Arabidopsis*). Medical genetics studies the heredity of human genetic diseases, their segregation in families of patients. It seeks to identify in this way the mutations responsible for diseases to develop treatments to cure them. Genomics studies the structure, composition and evolution of genomes (the entire DNA, three billion base pairs in humans, organized into chromosomes) and tries to identify patterns in the DNA may have a biological sense (genes, untranslated transcribed units, miRNAs, regulation units, developers, CNGS, etc; *Buzea et al.*, 2015; Butterfield, 2009; Chaplin, 2008; David, 2006; *Petrescu et al.*, 2015).

In genetics, all cellular energy processes are driven and controlled by ATP molecules type. ATP drives endergonic reactions by phosphorylation, transferring a phosphate group to some other molecule, such as a reactant.

## Materials and Methods

### *The Oxygen*

Oxygen is the chemical element of atomic number 8 to symbol O. It is the Group's holding of the chalcogen group, called group of oxygen. It was independently discovered in 1772 by Swedish Carl Wilhelm Scheele in Uppsala and in 1774 by the British Joseph Priestley in Wiltshire (Shimizu *et al.*, 1998).

A molecule having the chemical formula O<sub>2</sub>, commonly called "oxygen" and chemists, dioxygen consists of two oxygen atoms connected by covalent bond: The standard conditions for temperature and pressure, the oxygen is a gas, which is 20.8% of the volume of Earth's atmosphere at the sea (Butterfield, 2009; Krupenie, 1972).

Oxygen is a non-metal which forms very easily compounds, in particular oxides, with virtually all other chemical elements; this facility translates into high formation constants, but kinetically dioxygen is often very reactive at room temperature. Thus a mixture of oxygen and hydrogen, or iron, or sulfur, etc. evolves extremely slowly. That is, by mass, the third most abundant element in the universe after hydrogen and helium and the most abundant crustal elements (Shimizu *et al.*, 1998); oxygen and is on Terre: 86% of the mass of the oceans as water; 46.4% of the mass of the Earth's crust, particularly in the form of oxides and silicates; 23.1% of the mass of air in the form of oxygen or ozone, or 1.2×10<sup>15</sup> tonnes, nearly 21% of the total volume of the atmosphere; 62.5% of the mass of the human body; up to 88% of the mass of marine animals.

Earth was originally devoid of oxygen. This one is formed through photosynthesis performed by plants, algae and cyanobacteria, the latter appeared there may have 2.8 billion years. The O<sub>2</sub> oxygen is toxic to anaerobic organisms, which included the first forms of life emerged on Earth, but is essential for the respiration of aerobic organisms, which constitute the vast majority of living species (Butterfield, 2009). Cellular respiration is the set of metabolic pathways, such as the Krebs cycle and respiratory chain, powered, for example by glycolysis and the β-oxidation, through which one cell produces energy in form of ATP and reducing power as NADH + H + and FADH<sub>2</sub>.

By accumulating in Earth's atmosphere, the O<sub>2</sub> oxygen from photosynthesis formed an ozone layer at the base of the stratosphere under the influence of solar radiation. Ozone is an allotrope of oxygen chemical formula O<sub>3</sub> more oxidant than oxygen-making it an undesirable contaminant when present in the troposphere at ground level - but which has the characteristic of absorbing ultraviolet rays from the Sun and thus protect the biosphere of this harmful radiation: The ozone layer was the shield that allowed the first land plants to leave

the oceans there are about 475 million years. In normal conditions of temperature and pressure, oxygen is in the form of odorless, colorless gas, oxygen, chemical formula O<sub>2</sub>. Within the molecule, the two oxygen atoms are chemically bonded to each other in a triplet state (David, 2006). This bond, having an order of 2, is often represented schematically by a double bond or by a combination of binding to two electrons and two bonds to three electrons. The triplet state of oxygen is the ground state of the oxygen molecule. The electron configuration of the molecule has two unpaired electrons occupying two degenerate molecular orbitals. These orbitals are called antibonding and depress the bond order from three to two, so that the binding of oxygen is lower than the triple bond of dinitrogen to which all bonding orbitals are filled but many antibonding orbitals are not.

In its normal triplet state, the oxygen molecule is paramagnetic, that is to say, it acquires a magnetization under the effect of a magnetic field. This is due to magnetic moment of spin of unpaired electrons of the molecule and to the negative exchange interaction between neighboring molecules of O<sub>2</sub>. Liquid oxygen can be attracted by a magnet so that in laboratory experiments, liquid oxygen can be kept in balance against its own weight between the two poles of a strong magnet (Shimizu *et al.*, 1998).

Singlet oxygen is the name given to various excited species of the oxygen molecule wherein all the spins are paired. It is also produced in the troposphere by the photolysis of ozone by light rays of short wavelength and by the immune system as a source of active oxygen. Carotenoids in photosynthetic organisms (Hirayama *et al.*, 1994) play a major role in absorbing energy from singlet oxygen and converting it to its ground state de-energized before it can harm tissues (Buzea *et al.*, 2015; Petrescu *et al.*, 2015).

Oxygen is highly electronegative. He easily forms many ionic compounds with metals (oxides, hydroxides) (Shimizu *et al.*, 1998). It also forms ionocovalents compounds with non-metals (e.g., carbon dioxide, sulfur trioxide) and enters into the composition of many classes of organic molecules, for example, alcohols (R-OH), carbonyl R-CHO or R<sub>2</sub>CO and carboxylic acids (R-COOH). Dissociation energy of diatomic molecules O-X at 25°C given on kJ/mol  $D_{298}^{\circ}$ .

Oxygen is the most abundant chemical element from the perspective of the mass in the biosphere, air, water and terrestrial rocks. It is also the third most abundant element in the universe after hydrogen and helium and represents about 0.9% of the mass of the sun. It represents 49.2% of the mass of the Earth's crust and is the main constituent of our oceans (88.8% of their mass). The oxygen is the second most important component of the Earth's atmosphere, representing 20.8% of volume

and 23.1% of its mass (about 1015 tonnes). Earth presenting important gaseous oxygen in its atmosphere, is an exception among the planets of the solar system: The oxygen of neighboring planets Mars (which represents only 0.1% of the volume of the atmosphere) and Venus are much lower concentrations.

However, the oxygen surrounding these other planets is only produced by the ultraviolet radiation acting on the molecules containing oxygen such as carbon dioxide. The important and unusual concentration of oxygen on Earth is the result of oxygen cycles. This biogeochemical cycle describes the movement of oxygen within and between its three main reservoirs on Earth: The atmosphere, the biosphere and lithosphere. The main factor in achieving these cycles is that photosynthesis is the main responsible for the current level of oxygen on Earth.

The oxygen is essential to any ecosystem beings living photosynthetic give off oxygen in the atmosphere, while respiration and decomposition of animal and plant consumes. In the present equilibrium, production and consumption are realized in the same proportions: Each transfer is about 1/2000 of the total atmospheric oxygen each year. Finally, oxygen is an essential component of molecules that are found in all living things: Amino acids, sugars, etc (Hirayama *et al.*, 1994; Krupenie, 1972).

Oxygen also plays an important role in the aquatic environment (Butterfield, 2009). The increased solubility of oxygen at low temperatures has a significant impact on life in the oceans. For example, the density of living species is higher in polar waters due to the higher concentration of oxygen. Polluted water containing plant nutrients such as nitrates or phosphates can stimulate algae growth through a process called eutrophication and decomposition of these and other biomaterials can reduce the amount of oxygen in eutrophic waters. Scientists assess this aspect of water quality by measuring the biological oxygen demand of the water or the amount of oxygen necessary to return to a normal concentration of O<sub>2</sub>.

### *The Hydrogen*

Hydrogen is the chemical element of atomic number 1, symbol H. Hydrogen present on Earth is almost entirely of stable isotope <sup>1</sup>H (proton, neutron zero) but contains about 0.01% of <sup>2</sup>H (a neutron), also permanent. A third isotope <sup>3</sup>H (two neutrons), radioactive, is produced in nuclear explosions (Simpson and Weiner, 1989).

Hydrogen is the main component of the Sun and most stars (whose energy comes from nuclear fusion of the hydrogen) and the interstellar and intergalactic matter. It is a major component of giant planets, metallic form the heart of Jupiter and Saturn and in the

form of dihydrogen solid, liquid or gaseous in their outermost layers and the other giant planets. On Earth it is mainly present in liquid water, solid (ice) or gas (water vapor), but also in the form of hydrogen H<sub>2</sub> and CH<sub>4</sub> methane fumes from some volcanoes (Chaplin, 2008). In the earth's crust, hydrogen represents only 0.22% of carbon, oxygen far behind (47%) and silicon (27%). It is also rare in the Earth's atmosphere since dihydrogen represents in volume than 0.55 ppm of atmospheric gases. On Earth, the most common source of hydrogen is water, which molecule consists of two hydrogen atoms and an oxygen atom (Chaplin, 2008); Hydrogen is especially the main constituent (by number of atoms) of all living matter, together with the carbon in all organic compounds. For example, the hydrogen atoms is 63 and 10% of the mass of the human body (David, 2006).

Under very low pressures, such as those found in space, hydrogen tends to exist as individual atoms, simply because it is so unlikely that they collide to combine. The dihydrogen clouds are the basis of the process of star formation.

Hydrogen is the simplest chemical element; its most common isotope consists of only one proton and one electron. Hydrogen is thus the lightest existing atom. Since it has only one electron, it can form a covalent bond: It is a monovalent atom. However, the solid hydrogen may be metallic when under very high pressure. It crystallizes with a metal bond (see metallic hydrogen). In the periodic table of elements, it is in the column of alkali metals. However not being present in this state on Earth, it is not considered a metal chemistry (Simpson and Weiner, 1989).

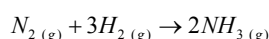
The most economical industrial process for producing hydrogen is the reforming of hydrocarbons. In practice, the most common method is the steam reforming of natural gas is mainly composed of methane. At a temperature between 700 and 1100°C, the steam reacts with methane to give carbon monoxide and hydrogen. The hydrogen purification is easier under high pressure reforming is carried out under a pressure of twenty atmospheres. The hydrogen/carbon monoxide is commonly referred to as synthesis gas. If the reaction is carried out in the presence of an excess of water vapor, carbon monoxide is oxidized to the higher oxidation level, leading to carbon dioxide, which increases the production of hydrogen (Simpson and Weiner, 1989).

### *The Nitrogen*

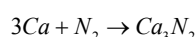
Nitrogen is the chemical element of atomic number 7, symbol N (the Nitrogenium Latin). It is the Group's holding of the pnictogen group. In everyday language, nitrogen means the simple body N<sub>2</sub> (dinitrogen), major constituent of the atmosphere, representing almost 4/5th of the air (78.06% by volume). Nitrogen is the 34th

member constituting the earth's crust in order of importance. The nitrogen-containing minerals are mainly nitrates, such as potassium nitrate  $KNO_3$  (constituting saltpetre) or nitre, which was once used to make explosive powders and sodium nitrate  $NaNO_3$  (constituent of Chile saltpetre).

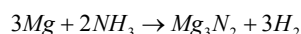
Dinitrogen  $N_2$  is the most common form of entity containing the chemical element nitrogen. The triple bond linking two atoms is one of the strong chemical bonds (with the carbon monoxide  $CO$ ). Thereby dinitrogen is kinetically inert. It is the most abundant component of the earth's atmosphere. Industrially, dinitrogen is obtained by distillation of the ambient air. Its main reactivity is the formation of ammonia by the Haber process:



The main compound having a chemical bond of the N-H is ammonia  $NH_3$ . Other compounds also contain this link. Eight nitrogen oxides are known. Many metal azides exist. Several synthetic routes are possible. The reaction between the metal (Ca) and the hot dinitrogen (Calcium is a chemical element with symbol Ca and atomic number 20. Calcium is a soft gray alkaline earth metal, fifth-most-abundant element by mass in the Earth's crust.):



The reaction between the metal and ammonia at high temperature:



Although the air already contains 78% nitrogen (dinitrogen to be precise), some aviation professionals or formula 1 (for example), this proportion increases and inflate tires with nitrogen almost pure (David, 2006). The gas having the property of being inert and stable maintains more constant pressure even in case of strong heating of the tire. Ironically and despite its name, the chemical element "nitrogen" is (with oxygen, hydrogen and carbon) a major component of the living and ecosystems and agro-ecosystems. It enters the composition of proteins (about 15%).

### The Phosphorus

Phosphorus is the chemical element of atomic number 15, symbol P (Poulaert and Chantrenne, 1952).

Phosphorus comes in many shapes in different colors: white, yellow, red and purple-black. Very pure, "white" Phosphorus is transparent; generally there is white amber, slightly malleable with low garlic odor. The red and black forms may arise powdered or crystallized.

In 1769, the Swedish Johan Gottlieb Gahn discovers that the phosphorus was present in the calcined bone powder then decomposed with sulfuric acid. It is noted that in combination with hydrogen, it produces a flammable gas. This may explain the wisps caused by the decomposition of materials rich in phosphorus in the marshes (David, 2006). We also understand that it is his presence that makes glow in the dark some organic materials such as roe and fish eggs, flesh of certain mollusks (oysters), some fresh fish skeletons, brain or liver substance some animals. He is credited as (sometimes wrongly) the phosphorescence of certain marine organisms and "the same waters of the sea, in some cases at least."

The current synthesis method was developed in 1867 by chemists E. and L. Aubertin Boblique. It can extract phosphorus from phosphorus rocks. This allows to obtain phosphorus in greater quantities and at a better price. Early matches used white phosphorus in their composition, toxicity phosphorus also made them quite dangerous: Their use led to murders, suicides and accidental poisonings (Poulaert and Chantrenne, 1952).

White and red phosphorus have a tetragonal structure (see the Fig. 1).

$P_4$  molecule, as in white phosphorus ([https://en.wikipedia.org/wiki/Phosphorus#/media/File:White\\_phosphorus\\_molecule.jpg](https://en.wikipedia.org/wiki/Phosphorus#/media/File:White_phosphorus_molecule.jpg))

Phosphates are quite common minerals in small amounts and scattered, the concentration typically has an animal origin (bird guano or bat accumulated over thousands or millions of years on dormitories sites or reproduction).

Foods with high phosphorus content:

- Sodas (those rich in phosphoric acid were about 20 mg of phosphorus in 100 mL.)
- Bacon, lamb brains, veal liver
- Hard cheese: Parmesan, emmental, county, gruyere, Gouda, Edam, Morbier, Cantal
- Whole milk powder
- Sardines, salmon, cod, carp, cuttlefish
- Cashews, Brazil nuts, pine nuts, pistachio
- Soy germ, contains about 700 mg of phosphorus in 100g
- Wheat bran, oats, millet

### The Carbon

Carbon is the chemical element of atomic number 6, symbol C. It is the leader of the group of crystallogens.

The carbon name comes from the Latin *carbo*, *carbōnis* ("coal").

The name carbon does not appear in the dictionary of the French Academy, until its 6th edition (1832). The Chemical Nomenclature of G. DE MORVEAU (1787), however, already devotes an article to it (article *Carbone du TLFi*, *TLFi*).

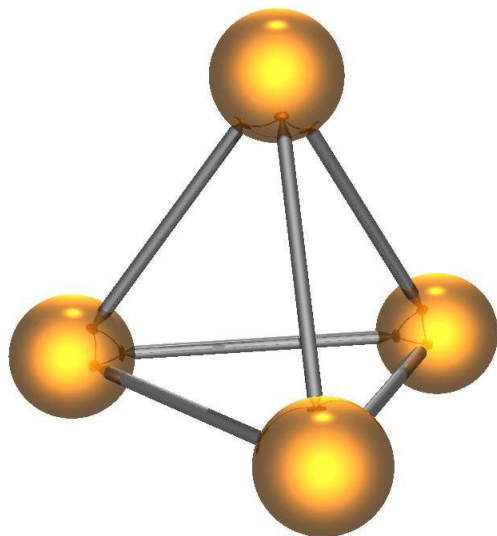


Fig. 1. Phosphorus tetragonal structure

In 1865 in an analysis of the impacts on the forest of the consumption of firewood in Paris, Becquerel publishes the carbon weights of the main forms of energy wood purchased at the time in Paris. According to him: 1 hardwood sterling (oak, elm, charm, beech and ash) has a carbon content of about 140 pounds; 1 white wooden stem (birch, aspen, poplar and softwood), 87 kilos; 1 stere of wood with fagots and cutters, 122 kilos.

Carbon is present on Earth since the formation of it: It was produced by nucleosynthesis in the heart of the stars that exploded before the formation of the solar system. It exists in the form of sediments, coal, oil and also in its pure form graphite, diamond. Natural diamonds can be found in kimberlite chimneys of ancient volcanoes, particularly in South Africa and Arkansas. Microscopic diamonds can sometimes be found in some meteorites.

It is marked by increased consideration of the importance of carbon. Second millennium BC-Elaboration (metallurgy) of cast iron and steel. Development of carburization, "older" treatment known in thermochemistry:

- 1797: Discover the shape "diamond" (see article synthetic diamond)
- 1828: Discovery of organic compounds and organic chemistry (see article Friedrich Wöhler)
- 1842: With the resistance of materials, August Wöhler lays the foundations for the future "science of materials"
- 2004: Discovery of graphene by Andre Geim, composed of a single layer of Graphite

The carbon element is not directly derived from the Big Bang (primordial nucleosynthesis), because the

conditions of its formation were not met (the expansion and cooling of the universe were too rapid).

On the other hand, carbon is mass produced in the core of very massive stars, known as the horizontal branch, where three nuclei of helium merge (triple alpha reaction).

The carbon has two stable isotopes in nature,  $^{12}\text{C}$  (abundance = 98.93%) and  $^{13}\text{C}$  (abundance = 1.07%). The first,  $^{12}\text{C}$ , was chosen as a single reference nuclide for atomic mass 12, after several propositions (formerly hydrogen, then together with oxygen for chemists). The atomic mass of carbon, 12.0107, is slightly greater than 12 because of the presence of the other isotope,  $^{13}\text{C}$ .

The radioisotope  $^{14}\text{C}$  has a period of 5,730 years and is commonly used for the dating of archaeological objects up to 50,000 years. It will not be of any use to archaeologists of tomorrow interested in the treasures of the present civilization because thermonuclear explosions carried out in the atmosphere from the 1960s have created considerable excesses. The radioisotope  $^{11}\text{C}$  has a period of 20 minutes. This short period and the relative ease of substituting an  $^{11}\text{C}$  atom for a  $^{12}\text{C}$  (stable) carbon atom make it an isotope used in nuclear medicine, particularly in positron emission tomography. The most widely used radiotracers to date are  $^{11}\text{C}$ -Racloprid which preferentially binds to D2 dopaminergic receptors and  $^{11}\text{C}$ -Acetate used in cardiac imaging.

Carbon is present in nature in two main allotropic forms: Graphite, stacked hexagonal and monoplane crystal structures (graphenes and gray color.) It is the stable form at ambient temperature and pressure.

The diamond, of tetrahedral crystal structure ("diamond" type structure) is transparent. It is the stable form at high temperature and high pressure, metastable at ambient temperature and pressure. Under normal pressure conditions, the carbon is in the graphite form, in which each atom is bound to three others in a layer of fused hexagonal rings, such as those of aromatic hydrocarbon compounds. By delocalizing the orbitals  $\pi$   $\{\displaystyle\pi\}$ , graphite conducts electricity. The graphite is soft because the chemical bonds between the planes are weak (2% of those of the planes) and the layers thus slide easily relative to each other (Fig. 2); (Greenwood and Earnshaw, 1994).

Under very high pressure, the carbon crystallizes in a center-face cubic system called diamond, in which each atom is bound to four others (interatomic distance of 136  $\mu\text{m}$ ). The diamond (Fig. 3 and 4), thanks to the resistance of carbon-carbon bonds, is, along with boron nitride, the hardest material to scratch. At room temperature, the graphite metamorphosis is so slow that it appears invisible. Under certain conditions, carbon crystallizes into lonsdaleite, a form similar to diamond but hexagonal. Of all the precious stones, the diamond is the only one to be completely consumed (Aversa *et al.*,

2016a; 2016b; 2016c; 2016d; 2016e; Petrescu *et al.*, 2016a; 2016b; 2016c; 2016d; Petrescu and Calautit, 2016a; 2016b).

In addition to graphite (pure  $sp^2$ ) and diamond (pure  $sp^3$ ), carbon exists in amorphous and highly disordered

form (a-C). These amorphous carbon forms are a mixture of three-bonded graphite or four diamond-bonded sites. Many methods are used to make a-C: Sputtering, electron beam evaporation, electric arc deposition, laser ablation.

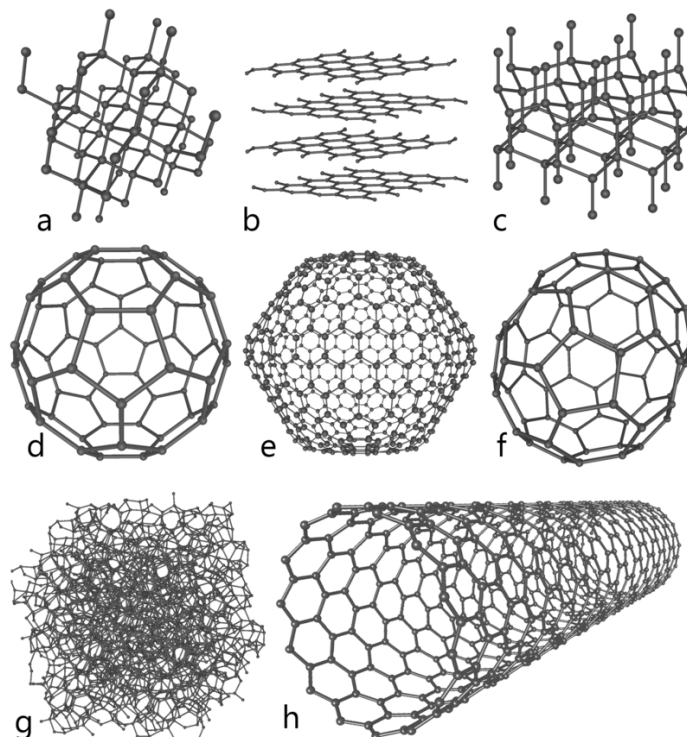


Fig. 2. Eight forms of carbon: diamond, graphite, lonsdaleite, buckminsterfullerene and 2 other fullerenes, amorphous and carbon nanotube

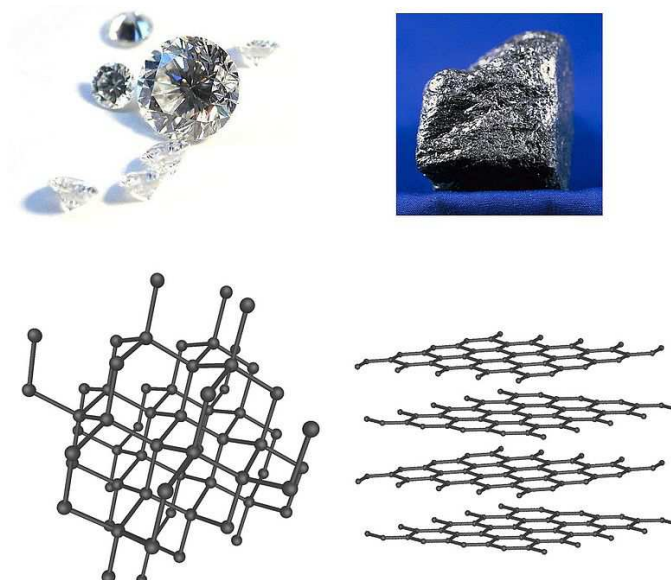


Fig. 3. Diamond and graphite are the two most common allotropic forms of carbon, they differ in their appearance (top) and their properties. This difference is due to their structure (below)



Fig. 4. Diamond, one of the most sought-after crystalline forms of carbon

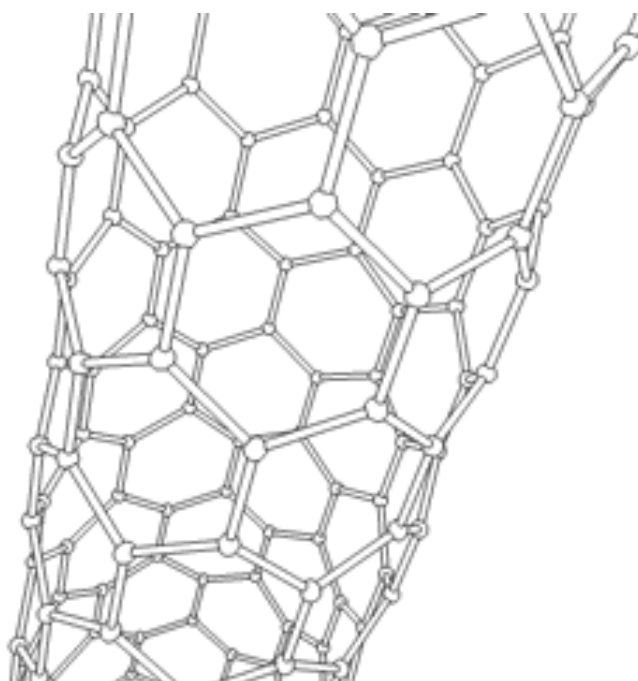


Fig. 5. Carbon nanotube

The carbon sublimates at 5 100 K. In gaseous form, it usually consists of small chains of atoms called carbynes. Chilled very slowly, they merge to form the irregular and deformed graphitic leaves that make up the soot. Among the latter, one finds in particular the spherical form monofeuillet called fullerene, or its full name buckminsterfullerene, C<sub>60</sub> and its varieties (C<sub>n</sub> n ≤20≤100), which form extremely rigid structures.

Carbon onions are structures based on a fullerene type structure, but the wall of which consists of several layers of carbon (Greenwood and Earnshaw, 1994).

The cylindrical shapes of carbon are called nanotubes (carbon nanotube, abbreviation: NTC; Fig. 5). They were found in the pellet forming at the cathode of the electric arc during the synthesis of fullerenes. These objects of nanometric diameter and length sometimes reaching one millimeter appear as planes of carbon of monoatomic thickness (or graphene) wound on themselves and forming a tube of nanometric diameter). The nanotubes whose wall consists of only one plane of carbon are called "monofeuillets". The nanotubes manufactured by the arc method are almost all "multifeuillets".

Graphene consists of a single carbon plane of monoatomic thickness. Graphene can be simply obtained by taking a single plane of carbon from a graphite crystal.

In conjunction with these structures, a large number of polyhedral nanoparticles are observed. As in the case of onions and multi-leaf nanotubes, High-Resolution Transmission Electron Microscopy (HRTEM) observations reveal that these carbon nanoparticles are made up of several closed layers of graphene leaving a nanoscale cavity at their center.

Carbon is the essential component of organic compounds, which frequently contain at least one carbon-hydrogen bond. However, carbon also exists in nature in inorganic form, mainly in the form of carbon dioxide and in mineral form.

## Results and Discussion

The four basic elements of life are: Oxygen, hydrogen, nitrogen and phosphorus. These four elements are found in abundance in both the human body and in animals. There are other elements that compose the human body, but the four we've highlighted participate in all life processes. Besides, these four elements make up ATP chains (molecule), which governs and controls the body entirely energy processes and physiological and pathological processes of the human body.

Oxygen is the pivot, which produces water and air and it is indispensable to the life.

Hydrogen participates with oxygen to produce water, without which life would not be possible.

Nitrogen with oxygen constitutes basic elements of air that compose the Earth's atmosphere.

Phosphorus is the last element of human energy chain. It is the fire and light. In other words, human energy chain consists of four basic elements, or three compounds: Water, air and fire (light). In genetics, all cellular energy processes are driven and controlled by ATP molecule type.

If we consider the chain of human genes, account must also be taken of the element carbon.

In this mode, the four elements of life become the five elements of life: Oxygen, hydrogen, nitrogen, phosphorus and carbon.

## Conclusion

The four basic elements of life are: Oxygen, hydrogen, nitrogen and phosphorus.

All cellular energy processes are driven and controlled by ATP molecules type. ATP drives endergonic reactions by phosphorylation, transferring a phosphate group to some other molecule, such as a reactant.

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Detailed their study may lead us to the discovery while great mysteries of human life, helping us to make life better, longer, more enjoyable.

While mitochondria begin to decline in number from our cell human body, leading to aging, lowering the water in cells, decreased ATP energy formations and then death.

On the other hand diminishing pool of water at the cellular level in the human body, lowers the number of mitochondria and ATP cellular energy formations.

Both of these processes interferes and depend on each other.

The primary role of genetics is to detect and remedy decreased numbers of mitochondria and water in new formats permanent human cells, to stop illnesses, malformations, stress, aging and death.

Another cause of human decline (conducted by cellular mitochondria decreased and cellular water decreased) is the cellular and mitochondrial food decrease in time.

In the other works we will seek together ways to better feed our cells and especially mitochondrial minicells.

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The five vital elements presented in the paper, plays an essential role in achieving both life energy and in achieving, maintaining and transmitting genetic information.

## Author's Contributions

Authors equally contributed for prepare and carry out the presented paper.

## Ethics

Authors have read and approved the manuscript and declare that no ethical issues involved.



## References

- Aversa, R., F.I. Petrescu, R.V. Petrescu and A. Apicella, 2016a. Biomimetic finite element analysis bone modeling for customized hybrid biological prostheses development. *Am. J. Applied Sci.*
- Aversa, R., R.V. Petrescu, F.I. Petrescu and A. Apicella, 2016b. Smart-factory: Optimization and process control of composite centrifuged pipes. *Am. J. Applied Sci.*
- Aversa, R., F. Tamburrino, R.V. Petrescu, F.I. Petrescu and M. Artur *et al.*, 2016c. Biomechanically inspired shape memory effect machines driven by muscle like acting NiTi alloys. *Am. J. Applied Sci.*
- Aversa, R. F.I. Petrescu, R.V. Petrescu and A. Apicella, 2016d. Biofidel FEA modeling of customized hybrid biological hip joint design part II: Flexible stem trabecular prostheses. *Am. J. Biochem. Biotechnol.*
- Aversa, R., F.I. Petrescu, R.V. Petrescu and A. Apicella, 2016e. Biofidel FEA modeling of customized hybrid biological hip joint prostheses, Part I: Biomechanical behavior of implanted femur. *Am. J. Biochem. Biotechnol.*
- Buzea, E., F.L. Petrescu, L. Nănuț, C. Nan and M. Neacșa, 2015. Mechatronic system to determine the concentration of carotenoids. *Anal. Craiova Univ.*, 20: 371-376.
- Butterfield, N.J., 2009. Oxygen, animals and oceanic ventilation: An alternative view. *Geobiology*, 7: 1-7. DOI: 10.1111/j.1472-4669.2009.00188.x
- Chaplin, M., 2008. Water hydrogen bonding.
- David, R.L., 2006. *CRC Handbook of Chemistry and Physics*. TF-CRC.
- Greenwood, N.N. and A. Earnshaw, 1994. *Chemistry of the elements*. Pergamon Press, ISBN-10: 0-08-022057-6, pp: 331.
- Hirayama, O., K. Nakamura, S. Hamada and Y. Kobayasi, 1994. Singlet oxygen quenching ability of naturally occurring carotenoids. *Lipids*, 29: 149-50. DOI: 10.1007/BF02537155
- Krupenie, P.H., 1972. The spectrum of molecular oxygen. *J. Phys. Chem. Ref. Data*, 1: 423-423. DOI: 10.1063/1.3253101
- Petrescu, F.I. and J.K. Calautit, 2016a. About the light dimensions. *Am. J. Applied Sci.*, 13: 321-325. DOI: 10.3844/ajeassp.2016.321.325
- Petrescu, F.I. and J.K. Calautit, 2016b. About nano fusion and dynamic fusion. *Am. J. Applied Sci.*, 13: 261-266. DOI: 10.3844/ajeassp.2016.261.266
- Petrescu, F.I., A. Apicella, R. Aversa, R.V. Petrescu and J.K. Calautit *et al.*, 2016a. Something about the mechanical moment of inertia. *Am. J. Applied Sci.*
- Petrescu, F.I., A. Apicella, R.V. Petrescu, S. Kozaitis and R. Bucinell *et al.*, 2016b. Environmental protection through nuclear energy. *Am. J. Applied Sci.*, 13: 941-946. DOI: 10.3844/ajeassp.2016.941.946
- Petrescu, R.V., R. Aversa, A. Apicella, S. Li and G. Chen *et al.*, 2016c. Something about electron dimension. *Am. J. Applied Sci.*, 13: 1272.1276. DOI: 10.3844/ajeassp.2016.1272.1276
- Petrescu, R.V., R. Aversa, A. Apicella, F. Berto and S. Li *et al.*, 2016d. Ecosphere protection through green energy. *Am. J. Applied Sci.*, 13: 1027.1032. DOI: 10.3844/ajeassp.2016.1027.1032
- Petrescu, FL., E. Buzea, L. Nănuț, M. Neacșa and C. Nan, 2015. The role of antioxidants in slowing aging of skin in a human. *Anal. Craiova Univ.*, 20: 567-574.
- Poulaert, G. and H. Chantrenne, 1952. Introduction de phosphore radio-actif dans l'acide adénosinetriphosphorique. *Arch. Physiol. Biochem.*, 60: 550-551. DOI: 10.3109/13813455209145119
- Shimizu, K., K. Suhara, M. Ikumo, M.I. Eremets and K. Amaya, 1998. Superconductivity in oxygen. *Nature*, 393: 767-69. DOI: 10.1038/31656
- Simpson, J.A. and E.S.C. Weiner, 1989. *Hydrogen*, Oxford English Dictionary. 2nd Ed., Clarendon Press, ISBN-10: 0-19-861219-2.