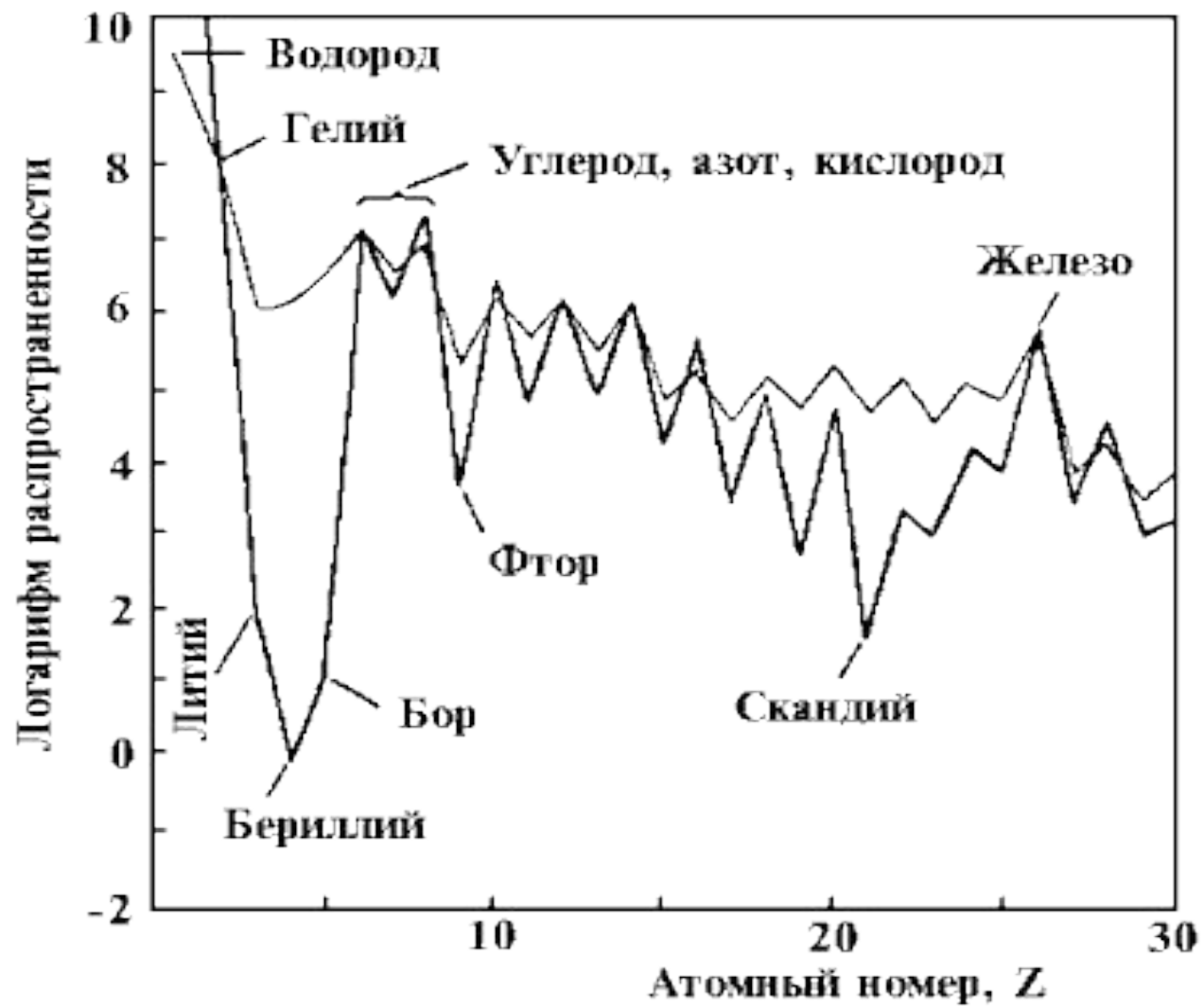


Facts about the oxygen

- Oxygen is the third most abundant element in the universe, according to the [Thomas Jefferson National Accelerator Facility](#), but much less than hydrogen and helium, the two most common.

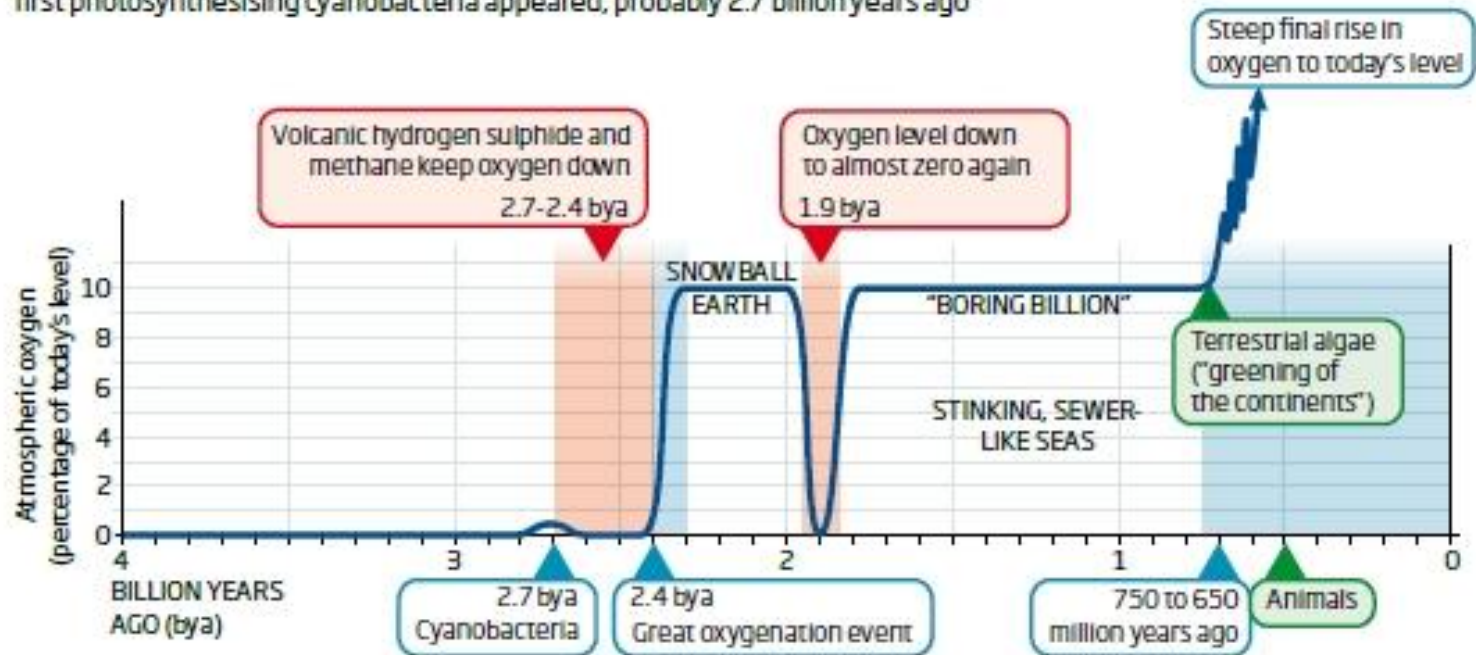




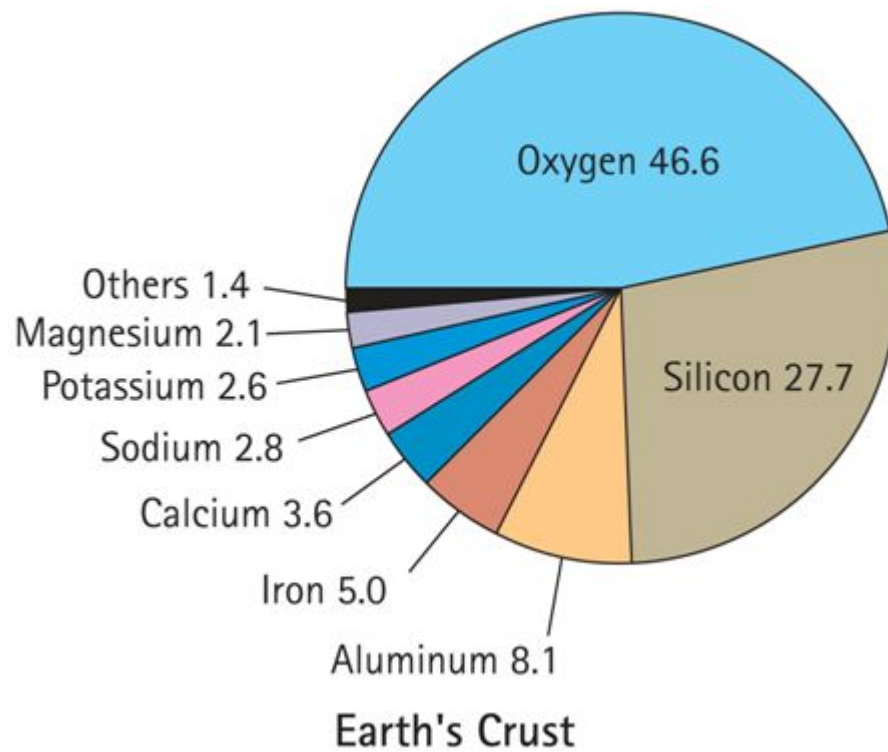
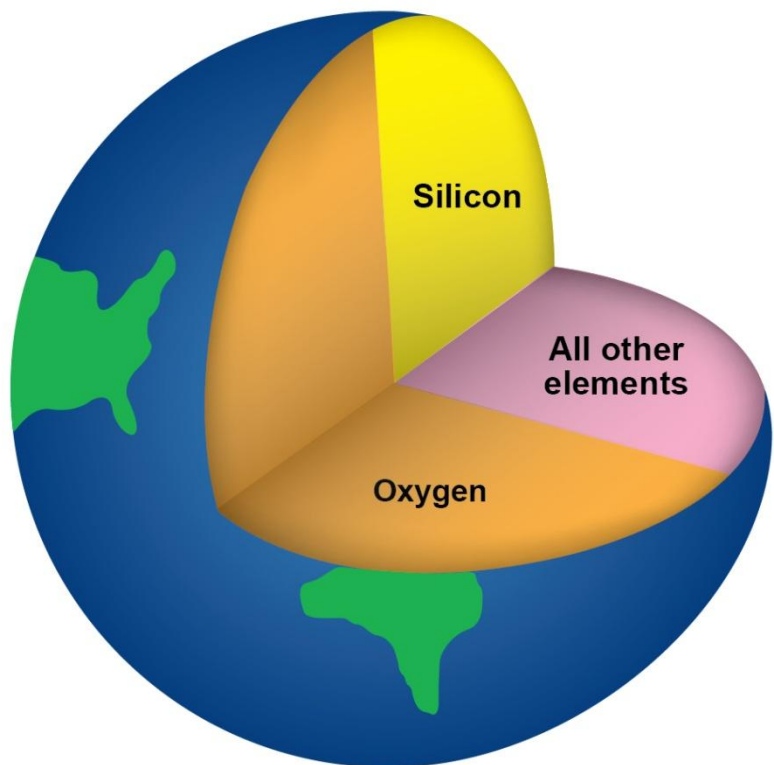
- However, its reactivity made it relatively rare in early Earth's atmosphere. It was much more due to the activity of cyanobacteria and plants. The period of active oxygen generation is called “Great oxygenation event”.

O₂ on the up

The rise of oxygen in Earth's atmosphere has experienced many setbacks since the first photosynthesising cyanobacteria appeared, probably 2.7 billion years ago



- Oxygen - the most common element of the earth's crust. Its content is 49.13% by weight and 91.8% by volume.



- Oxygen dissolved in water. Different fish species need different amounts of oxygen. The least demanding carp that lives quietly in an overgrown pond, where almost all the dissolved oxygen is consumed in the oxidation of organic substances. From the most fastidious pond fish in this sense - carp. He needs to oxygen concentration in the water is not less than 4 mg / l. Even more oxygen is required to fish that lives in the rivers, especially the mountain, such as trout.



RANGE OF TOLERANCE FOR DISSOLVED OXYGEN IN FISH

PARTS PER MILLION (PPM)
DISSOLVED OXYGEN

0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0



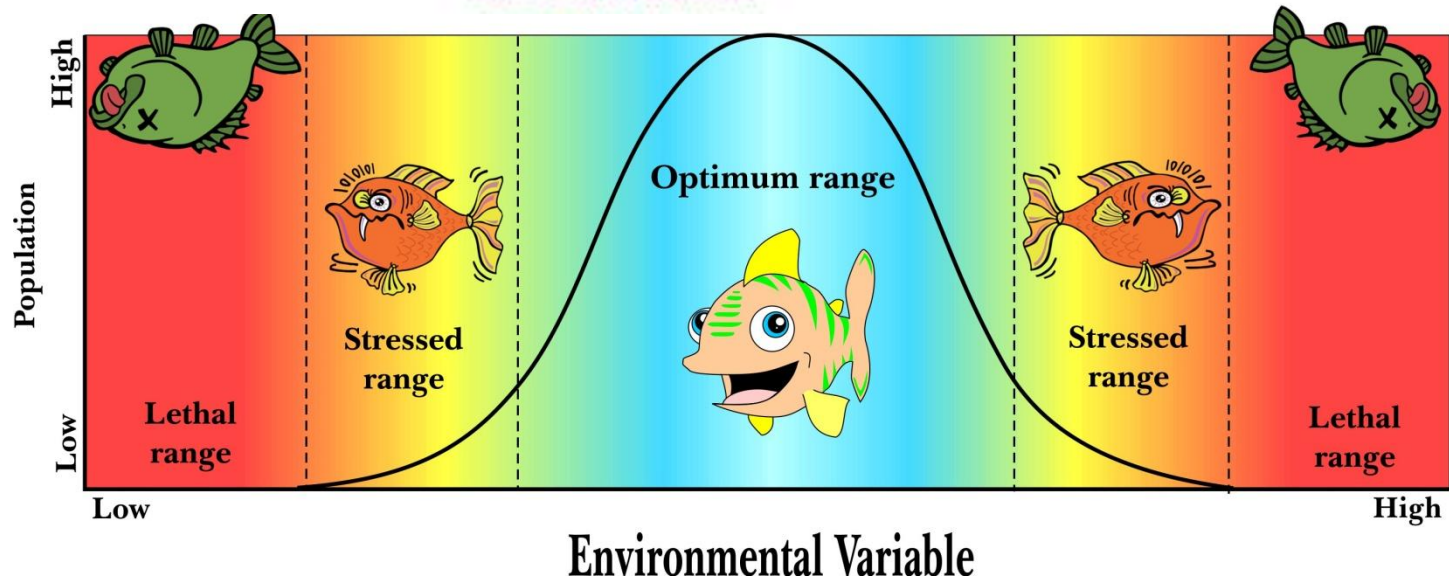
< 3.0 PPM
too low for
fish populations

3.0 - 5.0 PPM
12-24 hour
range of tolerance /
stressful conditions

6.0 PPM
supports
spawning

> 7.0 PPM
supports
growth/activity

> 9.0 PPM
supports
abundant
fish populations



Underwater Dissolved Oxygen Cycle

INPUT: Mixing by wind, waves and currents add atmospheric oxygen to surface water

High oxygen

Phytoplankton

INPUT: Photosynthesis by sea grasses, seaweed and phytoplankton

Mixing with river or ocean water can raise or lower the amount of oxygen

REMOVAL: Respiration: breathing by animals

REMOVAL: Respiration: decay of organic matter on the bottom

Low oxygen

Organic matter: poop and dead phytoplankton cells, plants, and animals that have fallen to the bottom from the surface waters

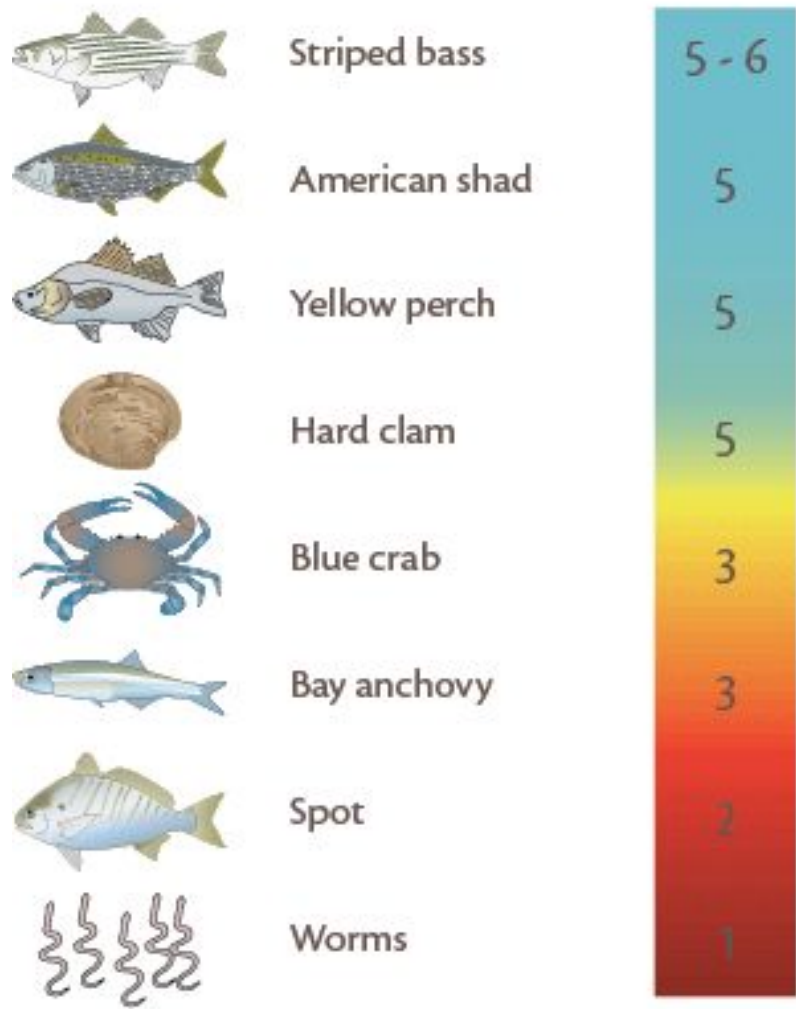
Photosynthesis:



Respiration:

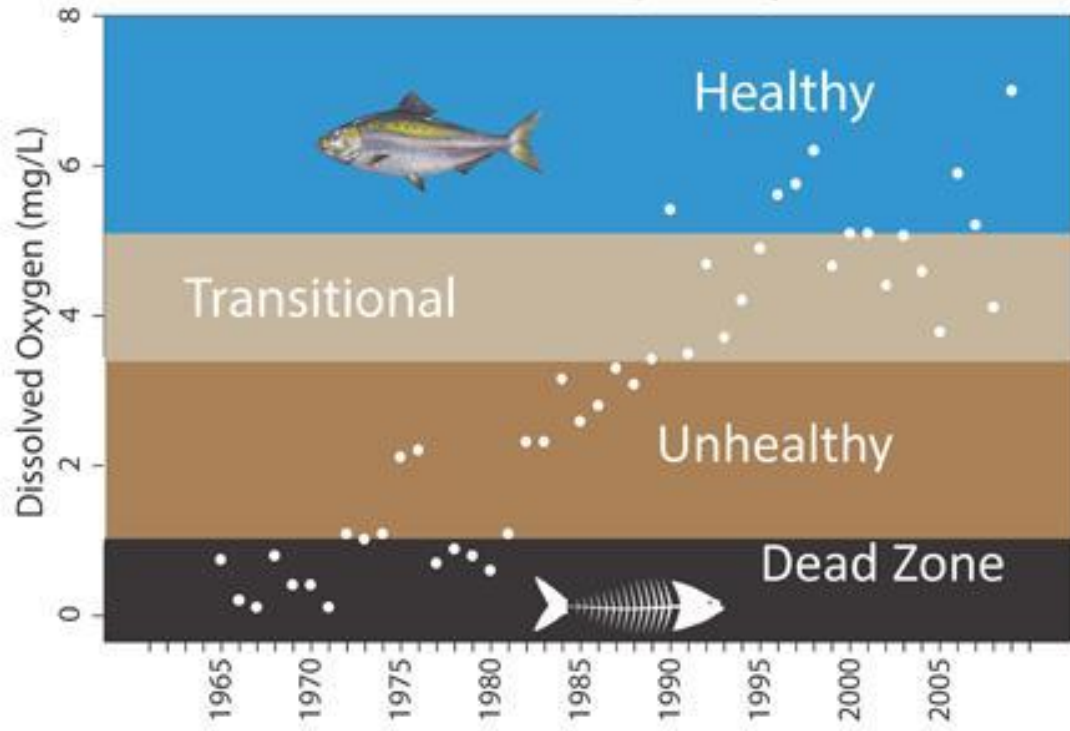


**Minimum oxygen requirements
(mg L⁻¹)**



'Minimum dissolved oxygen requirements for key organisms in Chesapeake Bay

Ben Franklin Bridge - July Data

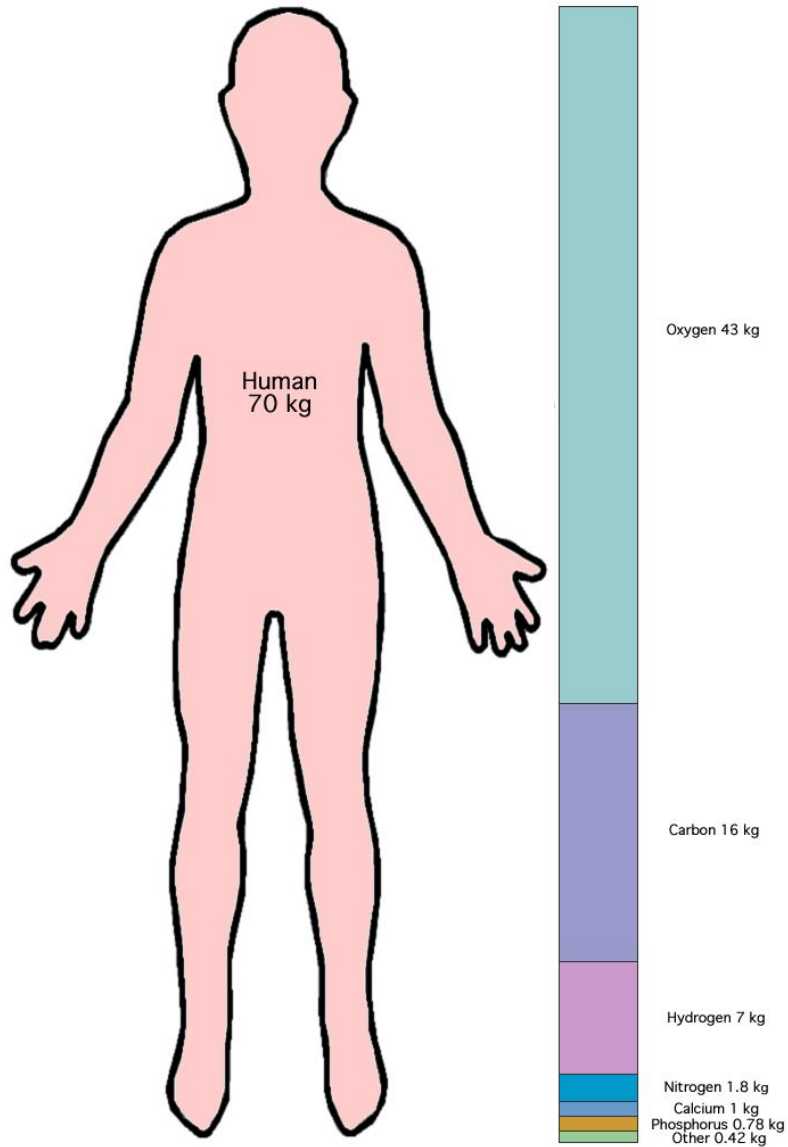


- Modern passenger aircraft when flying for 9 hours consumes 50-75 tonnes of oxygen. All plants of the Earth during the year create about 3,000 billion tons of oxygen.



- The body of an adult requires 39 kg of oxygen every day. During the day, a healthy person at rest is pumped through the lungs 7200l air permanently withdrawing from the atmosphere 720l oxygen. In large cities, the amount of oxygen in the air can be reduced to 18%, and in adverse weather conditions, up to 12-15%. Lack of oxygen a person begins to feel when it is already in the atmosphere reducing to 18%, and are critical to the life of 7%.

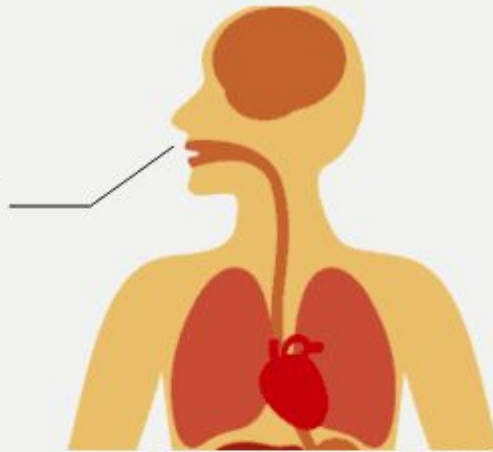
Composition of the human body by element



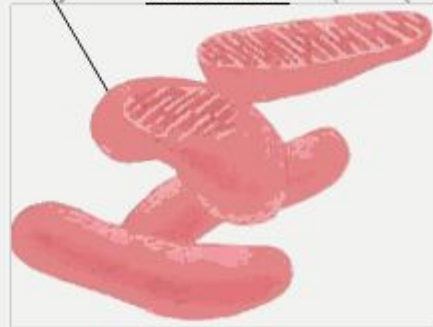
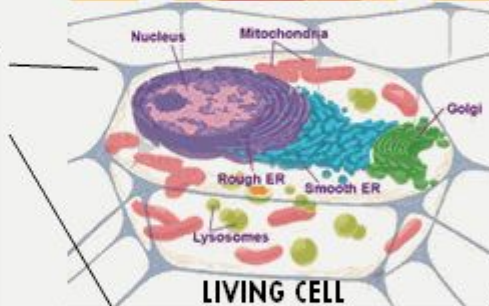
Others are made up of: potassium, sulphur, sodium, chlorine, magnesium, iron, fluorine, zinc, silicon, rubidium, strontium, bromine, lead, copper, aluminium, cadmium, cerium, barium, iodine, tin, titanium, boron, nickel, selenium, chromium, manganese, arsenic, lithium, cesium, mercury, germanium, molybdenum, cobalt, antimony, silver, niobium, zirconium, lanthanum, gallium, tellurium, yttrium, bismuth, thallium, indium, gold, scandium, tantalum, vanadium, thorium, uranium, samarium, beryllium, tungsten

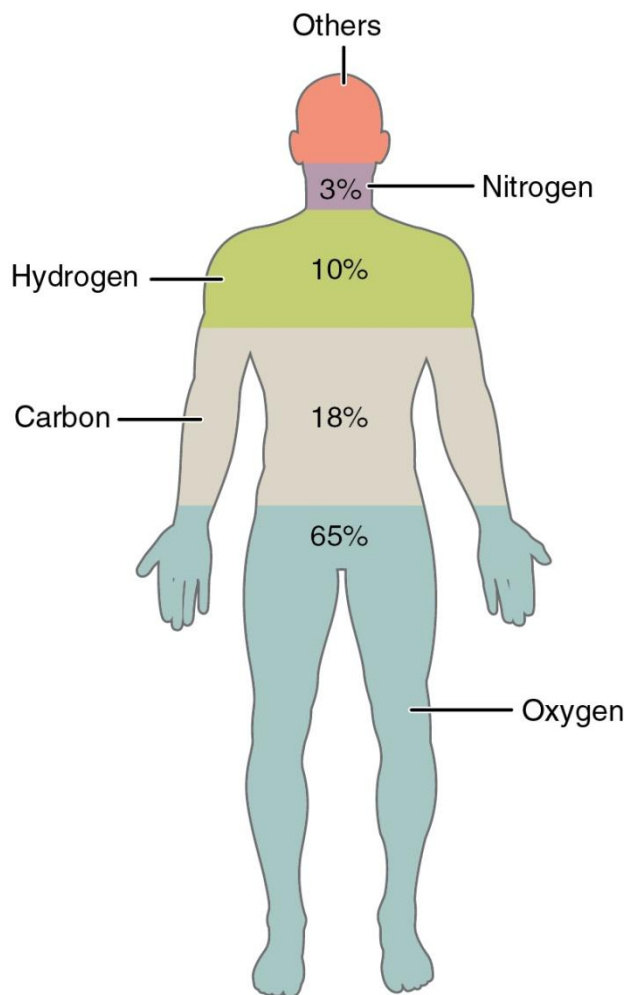
* Based on data from: Emsley, John, *The Elements*, 3rd ed., Clarendon Press, Oxford, 1998

**~4% of oxygen
breathed
become
oxygen-derived
“free radicals”**



**~90% of
oxygen is used
in the
mitochondria,
which are
power plants
within all
living cells.
~90% of
oxidation
occurs in
mitochondria.**





Element	Symbol	Percentage in Body
Oxygen	O	65.0
Carbon	C	18.5
Hydrogen	H	9.5
Nitrogen	N	3.2
Calcium	Ca	1.5
Phosphorus	P	1.0
Potassium	K	0.4
Sulfur	S	0.3
Sodium	Na	0.2
Chlorine	Cl	0.2
Magnesium	Mg	0.1
Trace elements include boron (B), chromium (Cr), cobalt (Co), copper (Cu), fluorine (F), iodine (I), iron (Fe), manganese (Mn), molybdenum (Mo), selenium (Se), silicon (Si), tin (Sn), vanadium (V), and zinc (Zn).		less than 1.0

- Interestingly that the human as a species formed when the oxygen concentration in the atmosphere has reached 38-40%. For lack of oxygen cause repressed emotions - scientists say. Inhibitions to express strong emotions leads to the fact that people "squeezed", and his breathing becomes intermittent. The main symptoms of hypoxia (lack of oxygen): weakness, fatigue, poor sleep, memory loss, headaches, frequent infections, depression.



Oxygen retards the aging of human cells



Oxygen helps relieve headaches



Oxygen alleviates tiredness



Oxygen boosts the immune system



Oxygen supports breathing of air in cases of asthma and allergies



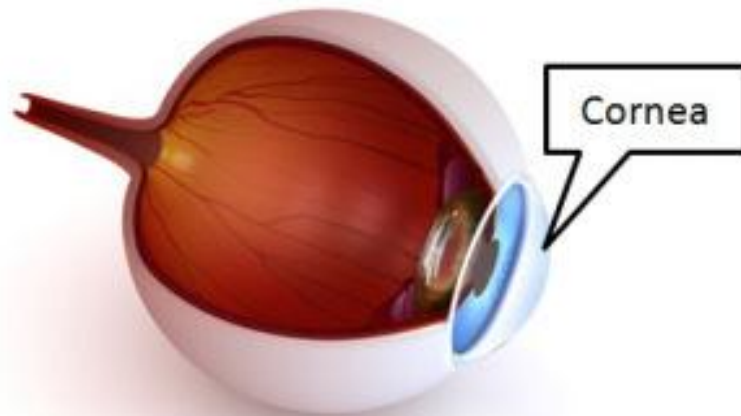
Oxygen helps in cases of depression



Oxygen improves physical performance by up to 25%



- Only one part of the body, has no blood supply - a cornea. It takes oxygen directly from the air.



- Your brain uses 20% of the total amount of oxygen in the body. It is believed that people yawn to send more oxygen to the brain, to chill out and wake him up.
- The brain can live for 4-6 minutes without oxygen, and then begins to die. Lack of oxygen from 5 to 10 minutes can cause irreversible brain damage.

- Oxygen was the atomic weight standard of comparison for the other elements until 1961 when the International Union of Pure and Applied Chemistry adopted carbon 12 as the new basis

AURORA

- The aurora is the name given to the bands of colored lights seen in the sky at the higher latitudes. The aurora borealis or Northern Lights are seen mainly near the Arctic Circle. The aurora australis or Southern Lights are seen in the southern hemisphere. The light you see comes from photons released by [oxygen](#) and [nitrogen](#) in the upper atmosphere. Energetic particles from the solar wind strike the layer of the atmosphere called the ionosphere, ionizing the atoms and molecules. When the ions return to the ground state, energy released as light produces the aurora.





- Each element releases specific wavelengths, so the colors you see depend on the type of atom that is excited, how much energy it received, and how the wavelengths of light blend with each other. Scattered light from the sun and moon may affect the colors, too. You can see a solid-colored aurora, but it's possible to get a rainbow-like effect through the bands. Scattered light from the sun can impart a violet or purple to the top of an aurora. Next, there may be red light atop a green or yellow-green band. There may be blue with the green or below it. The base of the aurora may be pink.



above 150 miles -- red -- oxygen
up to 150 miles -- green -- oxygen
above 60 miles -- purple or violet --
nitrogen
up to 60 miles -- blue -- nitrogen

- The big player in the aurora is oxygen. Oxygen is responsible for the vivid green (wavelength of 557.7 nm) and also for a deep brownish red (wavelength of 630.0 nm).
- Pure green and greenish yellow aurorae result from excitation of oxygen.



