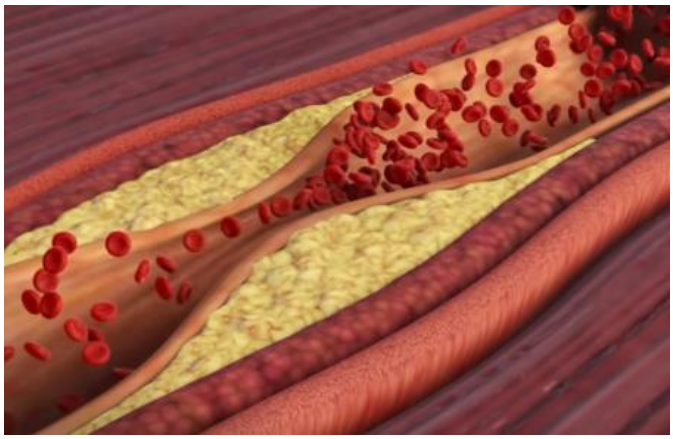
Medicine

Heart Attack

A heart attack is a frightening experience. If you have experienced a heart attack, or are close with someone who has, you should know this: You are not alone. In fact, tens of thousands of people survive heart attacks and go on to lead productive, enjoyable lives.

Your heart muscle needs oxygen to survive. A heart attack occurs when the blood flow that brings oxygen to the heart muscle is severely reduced or cut off completely.



This happens because coronary **arteries** that supply the heart muscle with blood flow can become narrowed from a buildup of fat, cholesterol and other substances that together are called plaque. This slow process is known as **atherosclerosis**.

When **plaque** within a heart artery breaks, a blood clot forms around the plaque. This **blood clot** can block the blood flow through the **artery** to the heart muscle.

Ischemia results when the heart muscle is starved for oxygen and nutrients. When damage or death of part of the heart muscle occurs as a result of ischemia, it's called a heart attack, or myocardial infarction (MI).

Sometimes a coronary artery temporarily contracts or goes into spasm. When this happens the artery narrows, and blood flow to part of the heart muscle decreases or stops.The causes of spasms are unclear. A spasm can occur in normal-appearing blood vessels as well as in **vessels** partly blocked by atherosclerosis. A severe spasm can cause a heart attack.

A heart attack can cause a cardiac arrest. In cardiac arrest (also called sudden **cardiac death** or **SCD**), death results when the heart suddenly stops working properly. This is caused by irregular heart rhythms called **arrhythmias.**

Source(text): heart.org

Source(image): nmal.nucleusmedicalmedia.com.

Biology

Atoms and Molecules

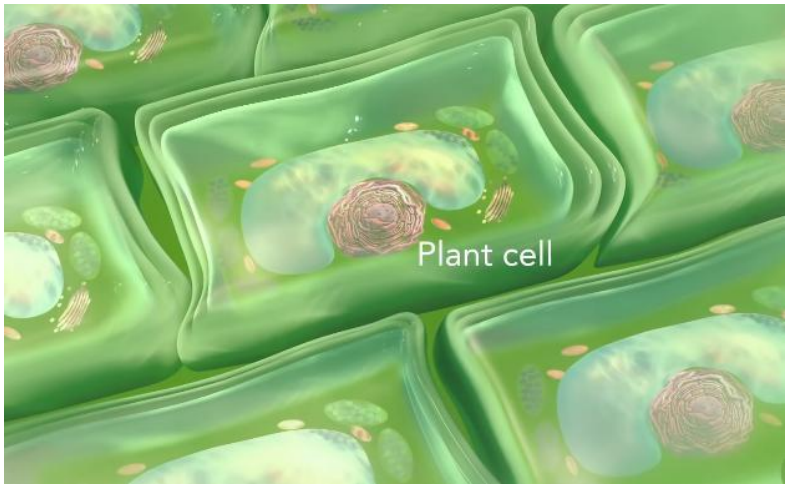
Atoms

Everyday experience should convince you that matter is found in myriad forms, yet all the matter you have ever seen is made of atoms, or atoms stuck together in configurations of dizzying complexity. A chemical element is a substance that cannot be made into a simpler form by ordinary chemical means. The smallest unit of a chemical element is an atom , and all atoms of a particular element are identical.

Parts of an Atom

There are two parts to an atom:

- At the center of an atom is a **nucleus** made up of two types of particles called protons and neutrons.
  - **Protons** have a positive electrical charge. The number of protons in the nucleus determines what element the atom is.
  - **Neutrons** are about the size of protons but have no charge.
- **Electrons** , much smaller than protons or neutrons, have a negative electrical charge, move at nearly the speed of light, and orbit the nucleus at exact distances, depending on their energy.



Molecules

In the previous section we said that many atoms are more stable when they have a net charge: they are more stable as ions. When a cation gets close to an anion, they link up because of their different net charges — positive charges attract negative charges and vice versa. When two or more atoms link up, they create a **molecule** . A molecule of water is made of two atoms of hydrogen (H) and one atom of oxygen (O). The **molecular mass** is the sum of the masses of all the atoms in the molecule. A collection of molecules is called a compound.

Source(text): courses.lumenlearning.com

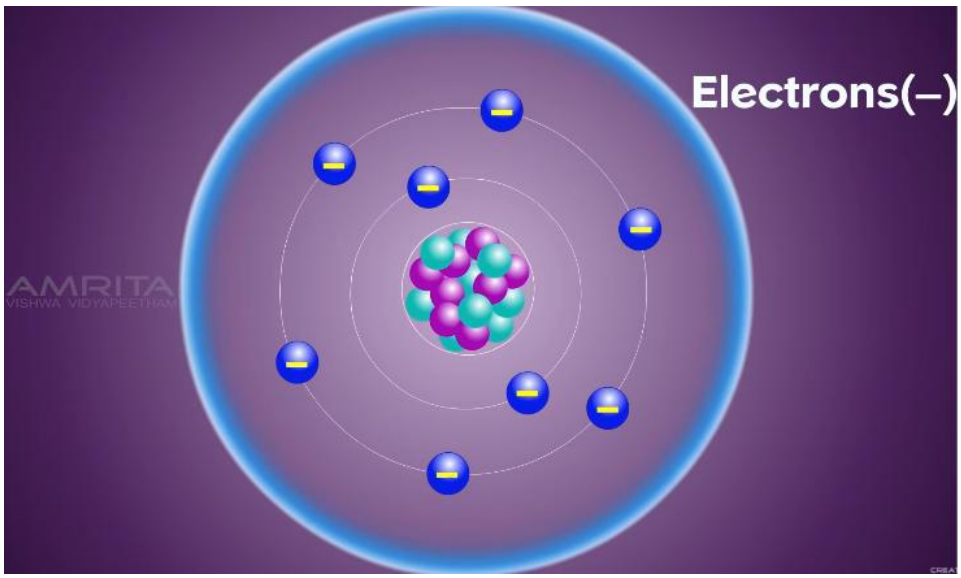
Source(image): amritacreate

Biochemistry

Cell Structure

The Chemical Components of a Cell

Matter is made of combinations of elements—substances such as hydrogen or carbon that cannot be broken down or converted into other substances by chemical means. The smallest particle of an element that still retains its distinctive chemical properties is an atom. However, the characteristics of substances other than pure elements—including the materials from which living cells are made—depend on the way their atoms are linked together in groups to form molecules. In order to understand how living organisms are built from inanimate matter, therefore, it is crucial to know how all of the chemical bonds that hold atoms together in molecules are formed.



Cells Are Made From a Few Types of Atoms

Each **atom** has at its center a positively charged **nucleus**, which is surrounded at some distance by a cloud of negatively charged **electrons**, held in a series of orbitals by electrostatic attraction to the nucleus. The nucleus in turn consists of two kinds of subatomic particles: **protons**, which are positively charged, and neutrons, which are electrically neutral. The number of protons in the atomic nucleus gives the atomic number.

There are 92 naturally occurring elements, each differing from the others in the number of protons and electrons in its atoms. Living organisms, however, are made of only a small selection of these elements, four of which—carbon (C), hydrogen (H), nitrogen (N), and oxygen (O)—make up 96.5% of an organism's weight.

The same set of weak forces governs the specific binding of other molecules to macromolecules, making possible the myriad associations between biological molecules that produce the structure and the chemistry of a cell.

Source(text): ncbi.nlm.nih.gov

Source(image): nucleus medical media

Physics

Electromagnetism

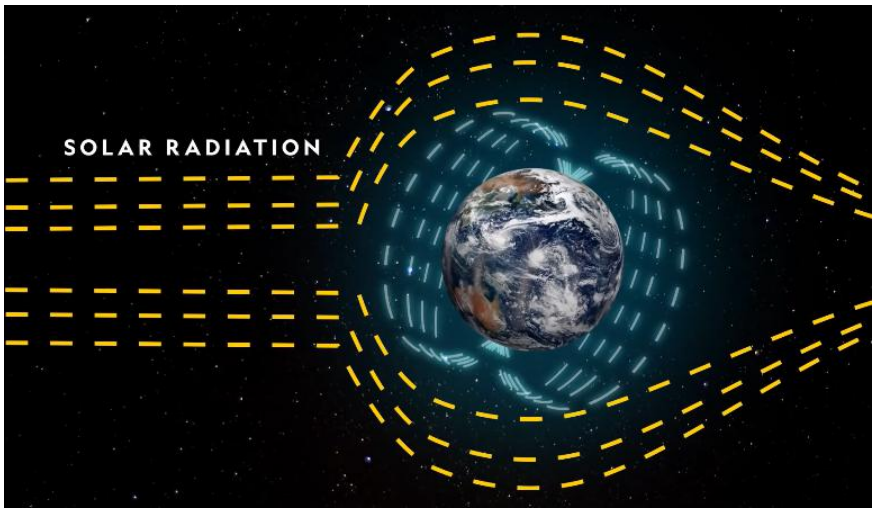
Electromagnetic solar radiation, energy escaping from the Sun

The Sun continuously emits two kinds of radiation: electromagnetic and corpuscular.

- Electromagnetic radiation provides light and warmth, but also consists of invisible radiation some of which can be harmful such as ultraviolet.
- Corpuscular radiation is made up of charged particles (ions and electrons) (Solar Wind)

Energy from the Sun at the speed of light in the form of a wave

Electromagnetic **solar radiation** is a phenomenon by which energy escapes from the Sun at the speed of light in the form of a wave. There are several types of radiation that can be expressed in terms of energy, wavelength or frequency (number of waves per second).



Solar radiation energy types

- **Visible sunlight**
  In a rainbow, the solar rays are arranged according to their wavelength (see illustration). From purple to red, the wave gets longer.
- **Infrared (IR)**
  With a wavelength larger than the one of red, it is not visible, but we feel its warmth.
- **Ultraviolet (UV)**
  Its wavelength is smaller than the one of purple. This part of the solar radiation, which is not visible either, can be harmful for humans.

Source(text): aeronomie.be

Source(image): National Geographic

Engineering

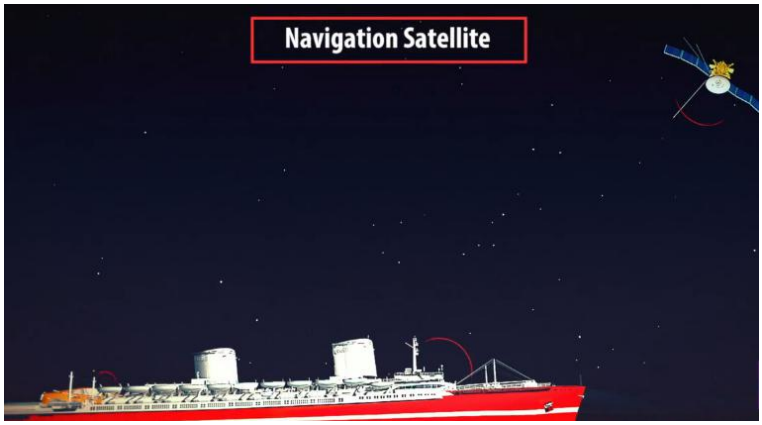
How Satellite Works

This article is part of the* NASA Knows! (Grades 5-8)*series

A satellite is a moon, planet or machine that orbits a planet or star. For example, Earth is a satellite because it orbits the sun. Likewise, the moon is a satellite because it orbits Earth. Usually, the word "satellite" refers to a machine that is launched into space and moves around Earth or another body in space.

Earth and the moon are examples of natural satellites. Thousands of artificial, or man-made, satellites orbit Earth. Some take pictures of the planet that help meteorologists predict weather and track hurricanes. Some take pictures of other planets, the sun, black holes, dark matter or faraway galaxies. These pictures help scientists better understand the solar system and universe.

Still other satellites are used mainly for communications, such as beaming TV signals and phone calls around the world. A group of more than 20 satellites make up the Global Positioning System, or GPS. If you have a GPS receiver, these satellites can help figure out your exact location.



How Do Satellites Orbit Earth?

Most satellites are launched into space on rockets. A satellite orbits Earth when its speed is balanced by the pull of Earth's gravity. Without this balance, the satellite would fly in a straight line off into space or fall back to Earth. Satellites orbit Earth at different heights, different speeds and along different paths. The two most common types of orbit are "geostationary" (jee-oh-STAY-shun-air-ee) and "polar."

A geostationary satellite travels from west to east over the equator. It moves in the same direction and at the same rate Earth is spinning. From Earth, a geostationary satellite looks like it is standing still since it is always above the same location.

Polar-orbiting satellites travel in a north-south direction from pole to pole. As Earth spins underneath, these satellites can scan the entire globe, one strip at a time.

Source(text): nasa.gov

Source(image): Kinetic School