

Essential Elements in the Human Body

What elements are found in the human body? Moreover, which ones are the most and least abundant? In this STEAM project, we will identify and discuss the most abundant elements in the human body as well as the most least common elements.

The four elements that make up the largest percentage of the human body's weight (96.2%) are oxygen (O), hydrogen (H), carbon (C), and nitrogen (N). The other seven common elements found in the human body are calcium (Ca), phosphorus (P), potassium (K), sodium (Na), chlorine (Cl), magnesium (Mg), and sulfur (S). The other trace elements (less than 0.01%) are boron (B), chromium (Cr), cobalt (Co), cadmium (Cd), copper (Cu), fluorine (F), iodine (I), iron (Fe), molybdenum (Mo), manganese (Mn), selenium (Se), silicon (Si), tin (Sn), vanadium (V), and zinc (Zn).

The first blue layer of jello represented oxygen. The human body contains 65.0% oxygen, which is an essential element for life on earth. Without oxygen, no life can exist. All the systems in our body rely on oxygen as it plays a critical role in respiration, the energy-producing chemistry that drives the metabolisms of most living things. The oxide reduction (redox) is a reaction that involves the transfer of electrons between atoms and molecules. These reactions are common and vital to some of the basic functions of life.

The second green layer represents carbon. It makes up for 18.5% of the human body. Glucose, sugar, and proteins are made of it. Carbon plays a crucial role in regulating the physiology of the body and is the basic building rock required to form proteins, fats, and carbohydrates.

Our third pink layer represents hydrogen, which makes up around 10% of our body. It is found in water and all organic molecules and is one of the simplest chemical elements. Hydrogen participates with oxygen to produce water. It is the lightest existing atom, and since it has only one electron, it can form a covalent bond called monovalent. This element allows the toxins and waste to be transported and eliminated. One of the main effects of hydrogen on the immune system is that it reduces the production of immune-active substances.

The purple layer represents our fourth last basic element, nitrogen, which makes up 3.2% of our body. Nitrogen is needed to synthesize amino acids, DNA, ATP, and RNA. Cell replacement and tissue healing require nitrogen for the generation of new cells. Nitrogen is required for the proper digestion of food, the growth of the human body, and the development of the human fetus.

The fifth yellow layer represents calcium, which makes up around 1.5% of our body. Calcium is a major component of bone mass. It is essential for muscle contraction and relaxation, nerve impulse transmission, oocyte activation, blood clotting, building strong bones and teeth, regulating heartbeat, and maintaining fluid balance within cells.

The sixth orange layer represents phosphorus, which is about 1% of our body. Calcium and phosphorus work together to build strong bones and teeth. About 85% of the body's phosphorus is in bones and teeth, with the remaining amount present in cells and tissues throughout the body. Phosphorus also plays an essential role in how the body stores and uses energy and helps filter out waste in the kidneys.

The seventh layer represents potassium, sulfur, sodium, chlorine, and magnesium, which comprise about 1.2 percent of our body. Potassium, sodium, and chlorine are minerals called electrolytes. They work to maintain water balance and regulate pressure between cells and their surrounding fluids. Sulfur protects our cells from damage that can lead to serious diseases.

The last layer has fruits to represent less than 1% of the trace elements in our body. Chromium helps the body use insulin. Iron carries oxygen and is found in hemoglobin in red blood cells and myoglobin in muscle cells. Iodine is part of thyroid hormones (thyroxin and triiodothyronine). Selenium acts as an antioxidant. Zinc is part of important enzyme systems and is found in the hormone insulin. Copper is part of many enzymes. Fluorine is part of teeth and bone and helps prevent cavities in teeth.

The body contains a lot of other different minerals. Additional minerals help in many other body processes, such as maintaining acid-base balance and keeping the body pH neutral, regulating body processes, such as in enzyme systems, functioning in nerve impulse transmission and muscle contraction, and helping release energy from food.

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