Global Research Journal of Natural Science and Technology Vol 1 Issue 2

Evolution Of the Global Phosphorus Cycle

Ahmad Abbas
University of Sargodha, Sargodha

Abstract

The phosphorus cycle is the storage and circulation of this element from the hydrophile, lithosphere, biology and the environment. It is a sedimentary type of biochemical cycle whose storage phase is mainly on the sea floor. The cycle begins with the erosion of phosphate rocks, water, air, and living things. When the rock wears out, it carries away the phosphate-carrying particles in pieces, which get into the soil or are dragged into the water bodies. Phosphorus absorbed by plants as phosphates through their roots is absorbed into your body and used in metabolism. Thus, it travels from the geological phase of the cycle to the biological phase where it circulates through food or traffic nets. This stage begins when herbivores use plants and get phosphorus from them. This element then travels to carnivores, which feed on herbivores and return to the soil through excretion or when the organisms die and rot.

Key Words: Evolution, Global Phosphorus, Cycle

Introduction

Phosphates, on the other hand, are extracted into lakes and oceans in the form of phosphates, which go into its hydrological phase. In addition, phosphates dissolved in water enter the biological phase when they are absorbed by phytoplankton and enter seafood traps.

Thereafter, phosphorus is released or released through the decomposition of organisms and re-integrates into the hydrological phase. At this stage, it may rotate along ocean currents or settle on the sediments of the ocean floor.

When phosphorus reaches the ocean floor, sedimentary layers accumulate and the bottom layers are buried very deep. This creates high pressure and temperature which creates a new rock rich in phosphorus which will be exposed once again to continue the cycle.

Adding extra phosphorus to the environment that spreads environmental pollution can turn this cycle into human activity.

Features

It is a non-metallic chemical element represented by the symbol P and which is not pure in nature as it oxidizes quickly. When this process takes place, it releases heat energy and produces light, hence the name phosphor ("light carrier") in Greek.

In nature it is found in the form of inorganic phosphorus molecules or as part of living organisms.

Your dizziness

The phosphorus cycle is a sedimentary biochemical cycle close to the cycle of water, carbon, calcium, iron and aluminum. It is called sediment because most of its deposits are in sea sediment and phosphate rocks in the earth's crust.

Exhibition

Phosphate rocks that are deep underground are brought to the surface by the movement of tectonic plates. When this happens, they are exposed to the action of physical agents such as rain and wind as well as biological elements.

Another way to release phosphorus from its underground storage is through volcanic activity, which is also caused by tectonic motions.

Since phosphate rocks are exposed to the external environment at the surface of the earth, erosion occurs at this time. Thus, through the difference in temperature, rain, wind, and living things, the rock cracks and disintegrates, and phosphorus becomes part of the soil or moves to other places.

Transport

The main erosion agent is water, which transports phosphorus to other parts of the lithosphere and eventually to the oceans.

Biological absorption and release

Most of the phosphorus in the soil is in impermeable form so it cannot be used by plants. Phosphorus is associated with dust particles, iron and aluminum hydroxides or in the form of calcium, ferric or other phosphates.

Thus, one hectare of soil can contain 2 to 10 tons of phosphorus, but plants can use only 3 to 15 kg. Soluble phosphorus is absorbed by the roots and goes into the body of plants where it is used in various places.

Phosphorus is absorbed into the structure of plants, forming proteins, ATP, DNA and other molecules. Similarly, when it dissolves in seawater, it is absorbed into the oceans by phytoplankton.

When plants and phytoplankton are eaten by herbivores and carnivores, phosphorus becomes part of the trophic chain. Later, it is expelled from living organisms or when they die.

Sediment and accumulation

Phosphorus in the oceans accumulates on the ocean floor, and becomes part of the sediment that will accumulate in continuous layers.

Fertilization and storage

Rocks are formed when sediments in the deepest parts of the earth's crust are subjected to high pressures and temperatures. This is because the weight of the upper sediment causes the lower ones to compact.

The crystallization of oxides, silica and other substances that form rocks keeps the particles together, a process called cementation. Thus, so-called sedimentary rocks are formed, which contain phosphate, which contains 20-30% phosphate.

If sedimentary rocks are subjected to high temperatures and pressures, they dissolve as part of metamorphic and agnes rocks (18%). Phosphates are also up to 0.18% in limestone and up to 0.27% even in limestone.

Cycle time

The speed at which phosphorus molecules

Completing the unit depends on the nature of the reserve. In coastal waters, for example, phosphorus molecules can be activated every 9 months, and in deep ocean sediments it can take more than 11,000 years.

The stages of the phosphorus cycle

The highest recycling of phosphorus occurs between living organisms and water or soil, depending on the type of ecosystem. It goes through three stages, which are:

- Geological

At this stage of the cycle the most important deposits of phosphorus are found in sea sediments and soil. It is also found in the emission of phosphate rocks and marine birds (Guyana).

Phosphate rocks are composed of marine sediments, which contain up to 30% phosphate. When they deteriorate, phosphates become part of the soil.

Similarly, soil and rock erosion drag phosphates into water bodies and reach the oceans where they are absorbed by marine organisms. On the other hand, relatively small amounts of phosphates in soil are dissolved in water and absorbed by plants.

- Hydrological

The hydrological phase of the phosphorus cycle maintains a constant exchange with land and with aquatic organisms. The largest amount of phosphorus is found in deep sea water as soluble phosphate.

Phosphorus in surface water is absorbed by living organisms and is therefore part of the biological phase.

Tickets

An estimated 10 million tons of phosphorus enters the reservoir annually. It enters the hydrological stage, driven by water currents, mainly through rainwater runoff.

In this way it reaches rivers and from there to lakes and oceans, as well as a small percentage of the ecological dust that accumulates in the oceans or other bodies.

Circulation

Phosphorus circulates in the oceans, especially in the cold lower layers, but reaches the surface in developed areas. Uplands are areas where deep cold water grows, which contains phosphates and other nutrients.

In these areas, the availability of phosphates is abundant, which favors the development of phytoplankton, which attracts large numbers of fish that feed on it.

Departure

Because phosphorus does not form volatile compounds (gases) in the ocean, it cannot be exchanged directly with the atmosphere. Therefore, the only way out of the hydrological phase is rock formation or fishing (by seabirds or human action).

In the first case, phosphorus is deposited in the ocean or accumulated on the shore from drains or living human carcasses. Over time, these sediments are covered by other layers and solidify as phosphate rocks that will then come to the surface of the earth.

For their part, marine animals use fish and carry phosphorus to pass through their expulsion (through death) or at the time of death. Humans, on the other hand, extract large amounts of phosphorus from the oceans through fishing, as fish bones contain 35% of this element.

- Biological

Once phosphorus enters traffic chains or food chains, it is part of the biological phase of the phosphorus cycle. It begins when phosphates absorbed by plants or photoplankton form proteins and other important molecules.

Phosphorus then circulates when plants and phytoplankton are eaten by herbivores and by carnivores. It is then transmitted through excretion and by the decomposition of dead organisms by bacteria and fungi.

Although the amount of phosphorus in the biological phase is relatively low, it plays a major role. Thus, 80% of the total phosphorus in the body of an organism is formed by hydroxyapatite (Ca5 (PO4) 3 OH).

These minerals make up about 70% of the bones and toothpaste is also made up of a high proportion of this phosphate mineral.

Departure

From this stage, phosphorus continues its cycle towards the hydrological and geological stages due to the death or expulsion of organisms. In the same way, man interferes with

the phosphorus cycle and removes it from the land and sea and uses it as an industrial raw material or fertilizer.

The seabirds that feed on fish form large coastal colonies and their emissions accumulate in large numbers in their habitats. These discharges are especially rich in phosphates and are used by humans as fertilizers.

Change

The main change in the phosphorus cycle is its acceleration due to human activity. Phosphates are a major contaminant in wastewater, causing changes in the phosphorus cycle by adding excess amounts to the ecosystem.

Eutrophication

Phosphates are added to sewers due to the use of detergents, including trasidium phosphate. When these compounds are mixed with water, phosphates are found in living things.

As phosphates enter these properties in large numbers, algae and aquatic plant populations increase significantly. Environmental imbalances eliminate the use of dissolved oxygen in water, leading to the death of fish and other organisms.

Water quality

In water Excess phosphates affect its quality for human consumption, thus reducing freshwater resources.

Essential for life

Phosphorus is the central component of ATP (adenosine triphosphate), the molecule through which energy is stored and transmitted to cells. On the other hand, DNA (deoxyribonucleic acid), the molecule responsible for transmitting genetic information, contains the phosphate group.

Diet and health

Phosphorus is an essential element for good health, considering that it is the second most abundant food in the body. It is also a major component of teeth and bones, which is closely related to B complex vitamins.

In addition, it plays an important role in the functioning of the kidneys, muscles (including the heart) and the nervous system (nervous signals).

Raw materials for industry

In industry, phosphates are used for various purposes, for example in the food industry they are used as antioxidant agents and stabilizers. Phosphorus is a key component in making matches, fireworks and light signs.

Similarly, it is used in the preparation of metal alloys, industrial oils, and in detergents as trisodium phosphate.

Fertilizers

Phosphorus is an important component of fertilizers and fertilizers used in agriculture, which is especially useful for flowering crops. Fertilizer production is responsible for 90% of the demand for phosphates.

Insecticides

Organic phosphates are in the form of phosphoric acid esters and in most cases have a neurotoxic effect, which is why they are used to make pesticides.

References

Kalu, P. (Ed) (1998). Encyclopedia of Environment and Environmental Management.

Margleif, R. (1974) Environment. Omega Edition

Miller, G. and Tyler, J.R. (1992). Ecology and ecology. Grupo Editorial Iberoamérica S.A. DCV

Odom, EP. And Warrett, G.W. (2006) Fundamentals of the environment. Fifth edition. Thomson

Rattenberg, KC (2003) Paper on the global phosphorus cycle geochemistry

Yan, Z, Han, W, Pilos, J, Sardens, J, Elser, J, Du, E, Reich, P and Feng, J (2016). Phosphorus accumulates faster than nitrogen globally in freshwater ecosystems under anthropogenic effects. Environmental letters.