

## Science & Math

# How the nitrogen cycle works



Nitrogen is the most plentiful element in Earth's atmosphere. It is a part of all living matter. It is essential to human survival as well as the survival of other animals and plants.

Even though they are surrounded by nitrogen in the atmosphere, animals and plants are unable to make use of free nitrogen. They lack the enzymes necessary to convert it to reactive forms they can work with. In fact, all higher life-forms depend on bacteria to do the work of nitrogen fixation.

In this process, free nitrogen is combined chemically with other elements to form more reactive compounds. These include ammonia, nitrates and nitrites.

# The Nitrogen Cycle Explained

The nitrogen cycle is the circulation of nitrogen, in various forms, through nature.

Nitrogen fixation is a key part of this cycle. The vast majority of nitrogen fixation in nature is performed by certain types of bacteria and by blue-green algae. Abiotic processes fix smaller amounts of atmospheric nitrogen. Those processes include lightning and ultraviolet radiation. Another abiotic process is the Haber-Bosch process. That is the industrial conversion of nitrogen into ammonia.

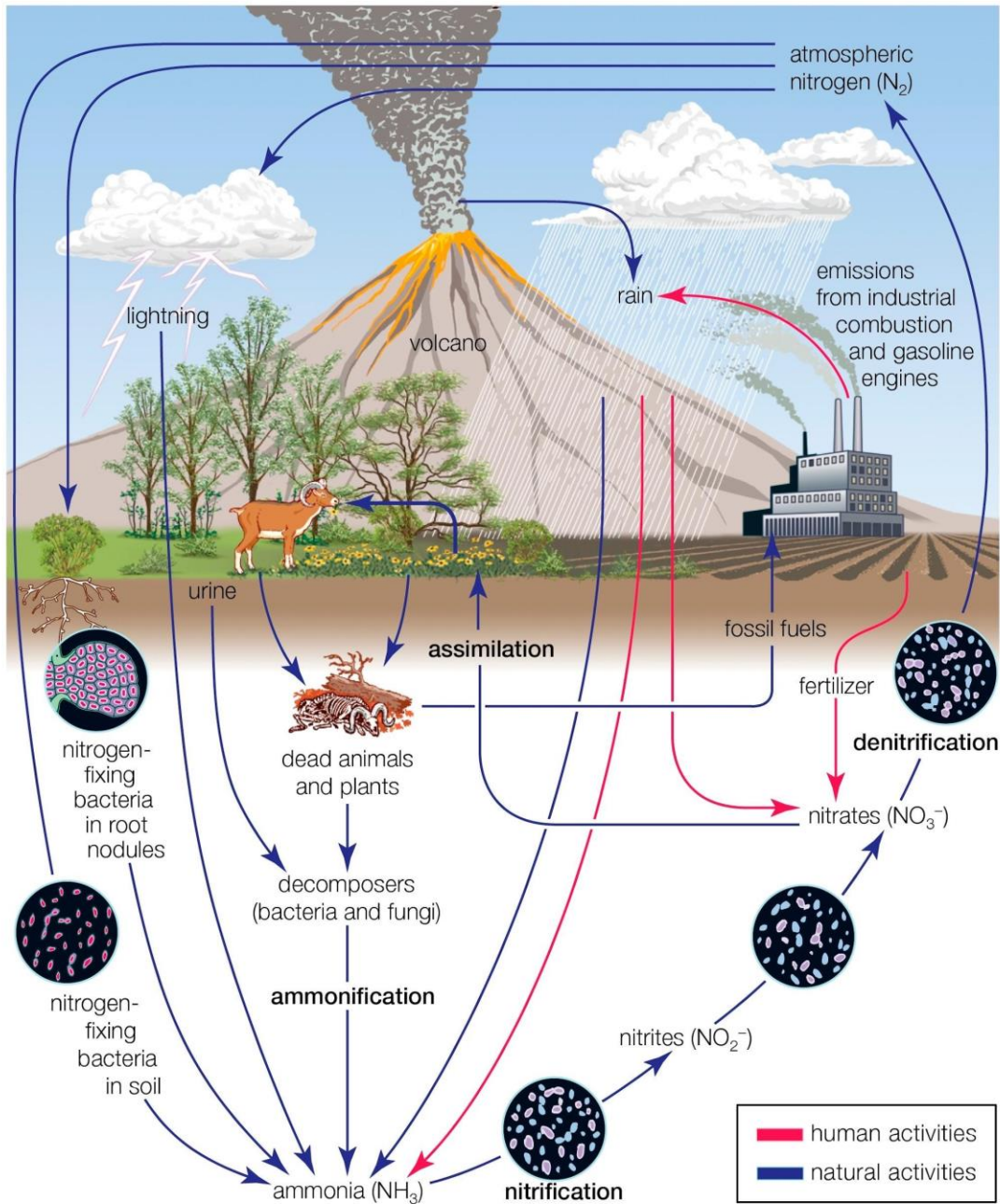


Image 2.

A diagram illustrating the nitrogen cycle, the circulation of nitrogen in various forms through nature. Photo by: Encyclopaedia Britannica/ UIG Via Getty Images

Nitrogen-based compounds are produced from nitrogen fixation. They are taken up into the tissues of algae and plants. Animals eat the algae and plants, taking up the

compounds into their own tissues. Animals use some of the compounds in their cells.

Others are broken down and excreted in the form of urea and other waste products. To excrete means to expel waste from the body; urination is one example.

Nitrogen-based compounds are released as wastes or occur in the bodies of dead organisms. These are converted to ammonia and then to nitrates and nitrites. After this, denitrifying bacteria in the environment get to work. They convert the nitrates and nitrites back to atmospheric nitrogen. The cycle begins again.