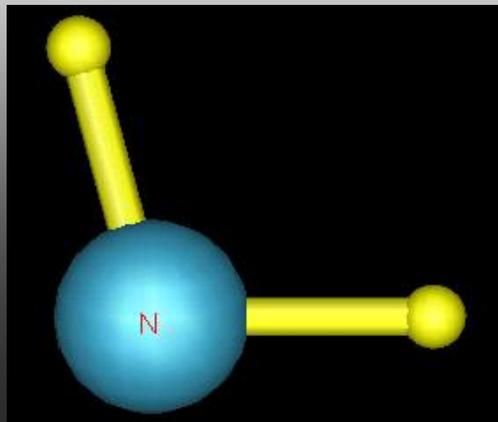


**THE BEST ELEMENT OF THEM ALL...**

# NITROGEN



So... I bet you're wondering EXACTLY what Nitrogen is! That's where I come in. I'm here to tell you absolutely EVERYTHING you need to know about the best element ever...

# NITROGEN

First, let's get all the scientific mumble-jumble out of the way! 😊 ! Below is all the scientific terms, measurements, etc., that you need to know about Nitrogen! Have fun...

**ATOMIC NUMBER: 7**

**ATOMIC SYMBOL: N**

**ATOMIC WEIGHT: 14.00674**

**ELECTRON CONFIGURATION: [He] 2s<sup>2</sup>2p<sup>3</sup>**

**MELTING POINT: -209.9 °C**

**BOILING POINT: -195.8 °C**

**NUMBER OF PROTONS/ELECTRONS: 7**

**NUMBER OF NEUTRONS: 7**

**CLASSIFICATION: Non-metal**

**CRYSTAL STRUCTURE: Hexagonal**

**DENSITY (@ 293 K): 1.2506 g/cm<sup>3</sup>**

**COLOR: colorless**

# HISTORY

**DISCOVERED BY:** chemist & physician Daniel Rutherford

**WHEN:** 1772

**HOW:** Mr. Rutherford discovered Nitrogen when he removed oxygen and carbon dioxide from air and proved that that residual gas would not support combustion or living organisms.

**WHO ELSE:** Many other scientists were also working on the problem of Nitrogen at the same exact time. These scientists included Scheele, Cavendish, Priestley, and many others

**NICKNAME:** Scientists used to call nitrogen *azote*, which means (in Greek) "burnt or dephlogisticated" \*\* air" (which meant air without oxygen) \*\*=spirit came out of fire

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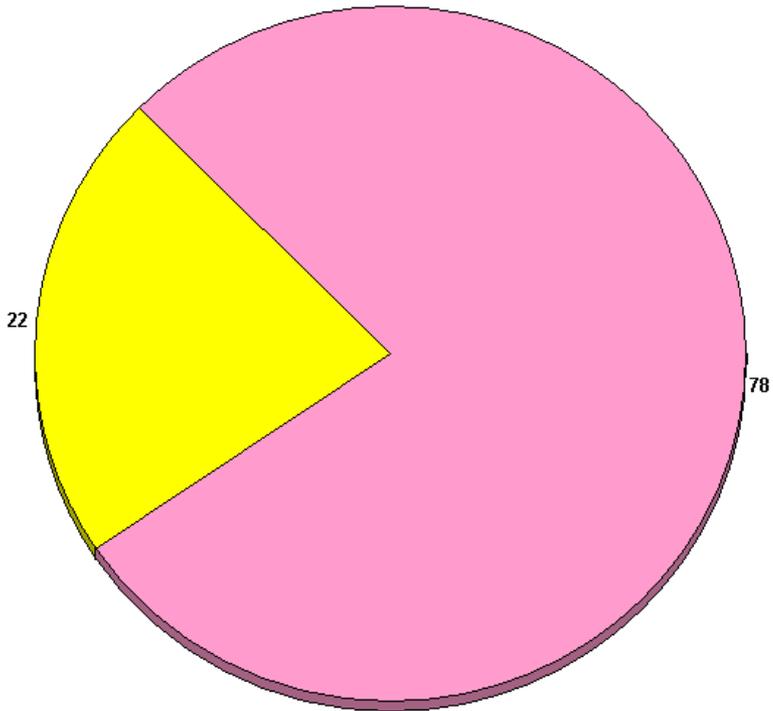
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Nitrogen gas ( $N_2$ ) makes up 78.1% of the entire Earth's air, by volume. Air composition of Mars, in comparison, is only 2.6% nitrogen. Nitrogen gas can be obtained by "liquefaction" and "fractional distillation". This element can be found in all living systems as part of the makeup of biological compounds.

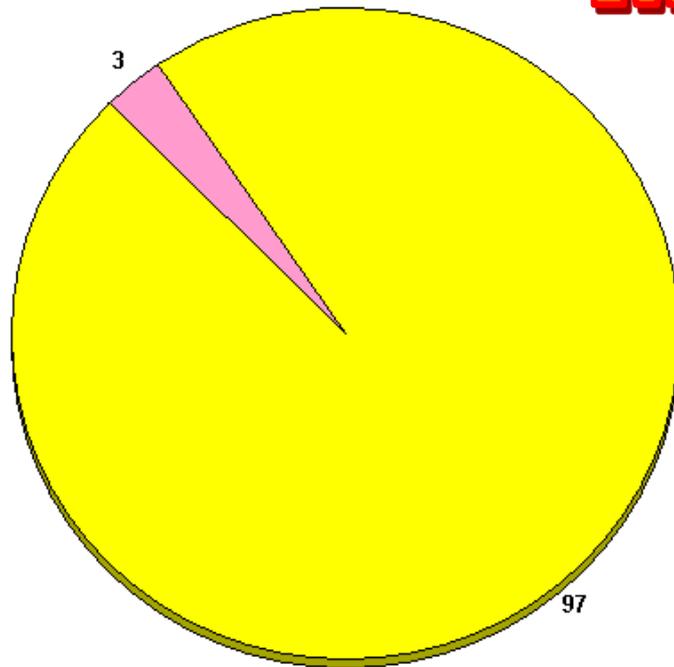
Therefore, every single breath that you take is almost 80% Nitrogen!! 😊



**EARTH**

■ NITROGEN  
■ OTHER ELEMENTS

**MARS**



■ NITROGEN  
■ OTHER ELEMENTS

**E**

**L**

**E**

**M**

**E**

**N**

**T**

The name "NITROGEN" came from French chemist Antoine Laurent Lavoisier. He named nitrogen *azote*, which means *without life (Greek)*. What is odd about this name is that nitrogen compounds can be found in many things that produce and sustain life. They can be found in foods, fertilizers, homes, etc.

# PHYSICAL PROPERTIES

## AS A GAS (g)

- colourless
- odourless & tasteless
- generally considered an inert element (inert=not readily reactive with other elements, therefore forming few or no chemical compounds)

## AS A LIQUID (l)

BOILING POINT:  $-195.8^{\circ}\text{C}$  (minus  $195.8^{\circ}\text{C}$ )

- colourless
- odourless & tasteless
- similar in appearance to water

\*\*Nitrogen (g) can be prepared by heating a water solution of ammonium nitrate ( $\text{NH}_4\text{NO}_3$ ).\*\*

# CHEMICAL PROPERTIES

\*\*obtained from liquid air\*\*

## WHEN HEATED

- combines directly with magnesium, lithium, or calcium
- when mixed with oxygen, and electrical sparks, forms nitric oxide & then dioxide
- when heated under pressure and combined hydrogen (while using a suitable catalyst), ammonia forms

\*\*Nitrogen is "fixed" from the atmosphere by bacteria in roots of plants such as clovers (hence the usefulness of clovers in crop rotation).\*\*

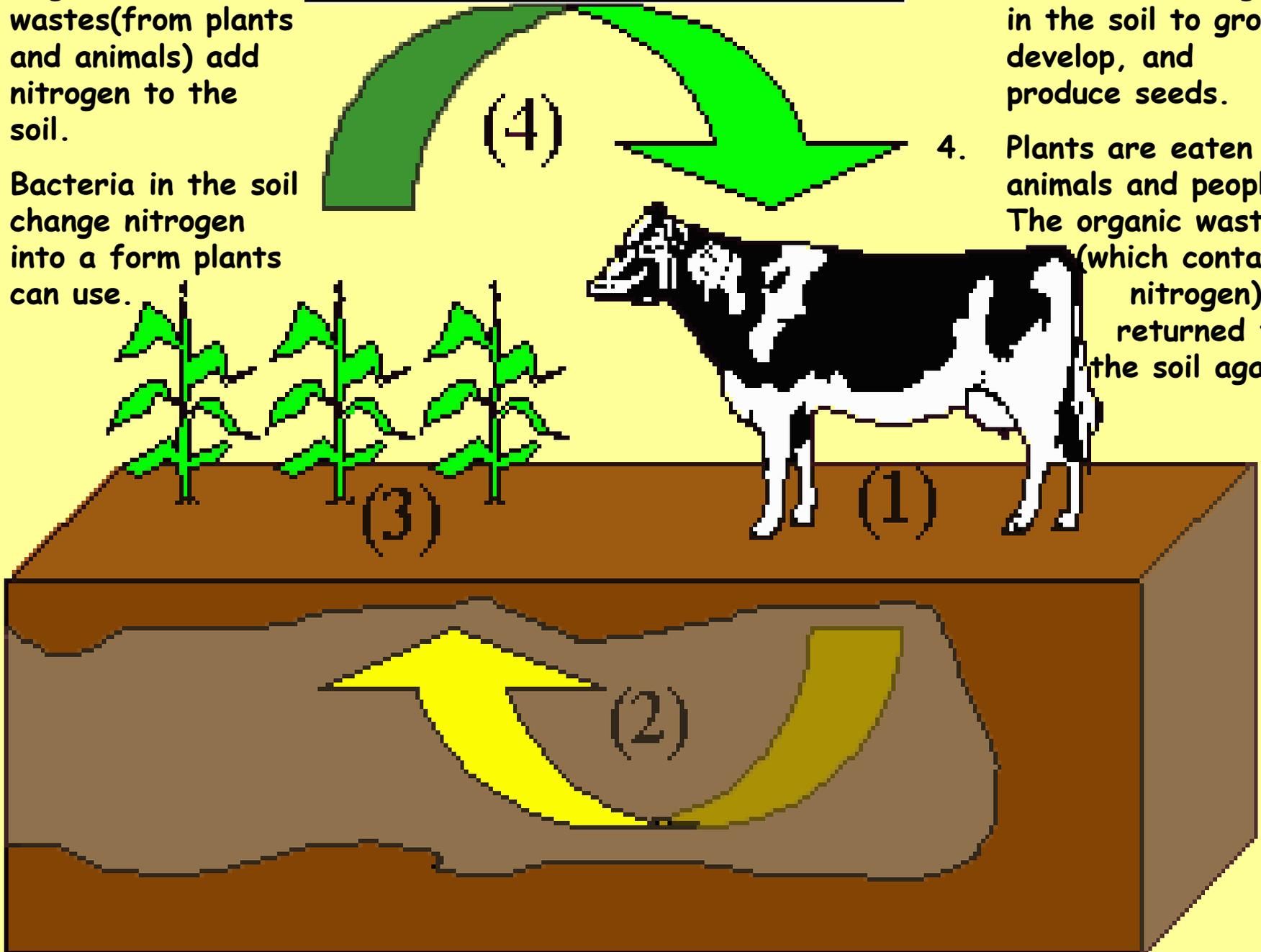
## BASIC STEPS OF NITROGEN CYCLE

1. Organic wastes (from plants and animals) add nitrogen to the soil.

2. Bacteria in the soil change nitrogen into a form plants can use.

3. Plants use nitrogen in the soil to grow, develop, and produce seeds.

4. Plants are eaten by animals and people. The organic waste (which contains nitrogen) is returned to the soil again.



**What do we  
use NITROGEN for...??**



# WORLD USES

The production and growth of all organisms depends on mostly one element, and one element only. The element that this depends on is NITROGEN. This element is required in large amounts as it is an essential part of all proteins, nucleic acids, etc. There is a large supply of nitrogen in the earth's atmosphere - nearly 79% in the form of  $N_2$  gas. In order for nitrogen to be used for growth it must be "fixed" (combined) in the form of ammonium ( $NH_4$ ) or nitrate ( $NO_3$ ) ions. The weathering of rocks releases these ions so slowly that it has almost no effect on the availability of fixed nitrogen. So, nitrogen is often the limiting factor for growth and biomass production in all environments where there is suitable climate and availability of water to support life.

Nitrogen is also used in ammonia. This is the greatest use of Nitrogen out of them all. Ammonia is used for fertilizer production and to produce nitric acid. Liquid Nitrogen is also used by the oil industry to build up pressure in wells to force crude oil upward to be harvested and used in the economy.

# IN YOUR HOUSE?!?!?!?



Nitrogen dioxide is common in outdoor pollution, but it can also be found in your house! ☹️ ! Nitrogen is a very harmful gas that can irritate your eyes and lungs. It can also make it easier to get infections in your lungs!

Nitrogen dioxide comes from gas stoves and ovens, water heaters, and fireplaces. It can build up in your house if you don't let enough of it leave through open windows or vents.

**\*\* So remember... when cooking you better keep those windows OPEN! \*\***



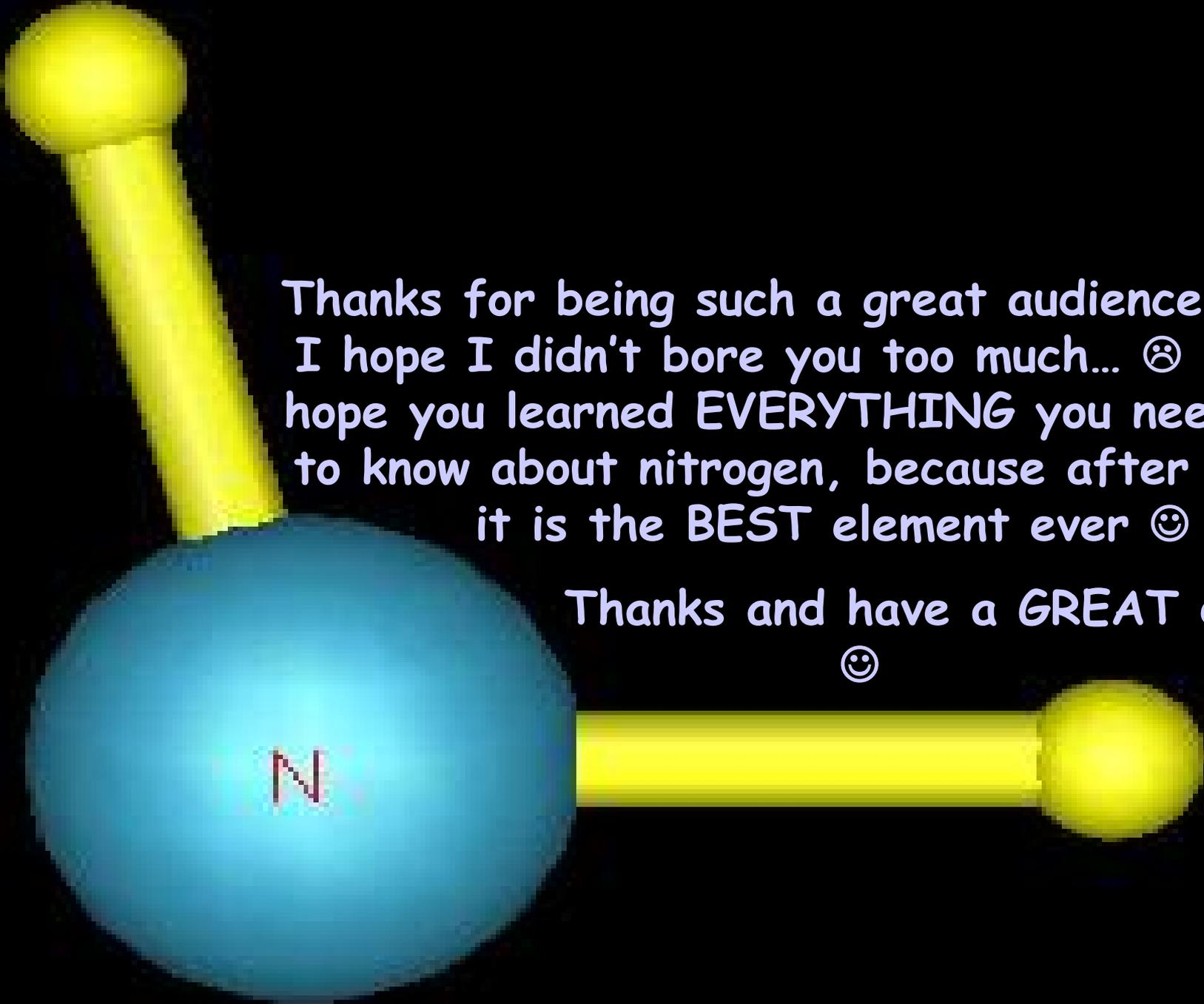
# IN OUR GARDENS



Yes, azote, known to us as NITROGEN is ALSO used in our gardens! Plants need nitrogen in order to form valuable proteins and nucleic acids, like DNA (which is very important). Some plants (like peas & beans) get their nitrogen from certain soil bacteria. Most plants obtain their nitrogen compounds through soil, however, fertilizers may increase their yield of nitrogen compounds. The most commonly used fertilizer is comprised of ammonia. ( $\text{NH}_3$ ). When ammonia is in it's liquid form, it is injected below the surface of the soil. Nitrogen fertilizers can also be placed in soil while in solid form. When it is inserted this way, it is similar to the little granules you can see in typical lawn fertilizers. Ammonium Nitrate ( $\text{NH}_4\text{NO}_3$ ) is an abundant example of a solid fertilizer.

# InTeReStInG fAcTs

- Our body produces nitrogen-containing compounds called "amino acids". Various proteins are made from the necessary amino acids and it is important that all the amino acids should be present in sufficient quantities. We produce 12 of the 20 amino acids in our bodies. The remaining 8 cannot be produced by the body but rather by our diet (what we eat).
- Nitrogen is an element
- Slightly less dense than air
- Will not burn or support burning
- Used to decrease spoilage in crops



Thanks for being such a great audience 😊 !  
I hope I didn't bore you too much... ☹️ ... I  
hope you learned **EVERYTHING** you needed  
to know about nitrogen, because after all,  
it is the **BEST** element ever 😊 !!!

Thanks and have a **GREAT** day  
😊

# WEB-SITES USED DURING RESEARCH

<http://pearl1.lanl.gov/periodic/elements/7.html>

<http://www.webelements.com/webelements/elements/text/N/key.html>

<http://helios.bto.ed.ac.uk/bto/microbes/nitrogen.html>

As well as the book: "SCIENCEPOWER9"

**THE END**



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