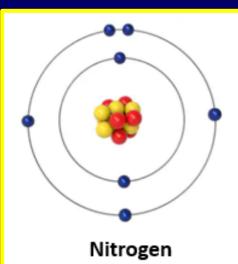


### **Can Statements**

At the end of this lesson, you should be able to say, with confidence:

- I can describe how water is recycled in an ecosystem.
- I can explain how nitrogen is recycled in an ecosystem.

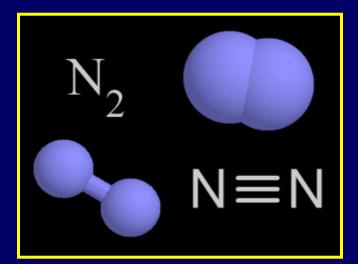
Nitrogen is an essential element for all life and is used to form proteins and nucleic acids.



1 IA I H Hydrogen ZA	IIA												15 VA	16 VIA 6A	17 VIIA 7A	18 VIIIA 8A <sup>2</sup> Hetum
3 Lithium site: 4 Beryflium site:											5 Boron 30811	6 Carbon 12011	Nitrogen S4.007	O Oxygen 15999	9 Fluorine 18,999	10 Neon 20140
11 12 Na Sodiam 22 599	3 ШВ 3В	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8	— <sup>9</sup> ∞ 100 –	10	11 IB 1B	12 IIB 2B	13 Aluminum 25.982	14 Silicon 28.086	15 P Phosphorus 30.974	16 Sultur 12066	17 Cl Otiorine 354E1	Argun Argun 25.948
19 Z0 2 Potassium Hotel Hotel K Ca Calcium K Come	Scandium 44.956	22 Ti Titanium 47.88	23 Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 5438	26 Fe 200 25,933	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63346	30 Zn Zinc 65.19	Gallium	32 Germanium 72.61	As Arsenic 74.922	Selenium 78.972	35 Br Bromine 75904	36 Krypton Se fel
37 38 3 Robidium Sfr Strontium 17/82	19 Yttrium 88:906	40 Zr Zirconium 91.224	41 Niobium 92305	42 Mo Molybdenum 95,95	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.413	49 In Indium 114818	SO Sn Tin Tin Tin Tin	Sb Antimony 121760	52 Te Telturium 127.6	53 I Todine 126.909	S4 Xenon 111,29
55 56 55 56 5 Cs Ba Cesium 137,127	57-71	72 Hafnium 17849	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 185.307	76 Osmium 190.25	77 Ir Iridium 192.22	78 Platinum 195.08	79 Au Gold 196.967	BO Hg Mercury 20039	81 Ti Thallium 204.383	B2 Pb Lead 307.2	83 Bismuth 208,980	Polorium	85 At Astatine 2009 9467	Radon 85 Radon 522/018
87 Francium Francium 225.025	19-103	104 Rf Rutherfordium	105 Db Dubrium (262)	106 Sg Seaborgium (294)	107 Bh Bolvium (264)	108 Hassium (269)	109 Mt Meitnerium (258)	110 DS Darmstadtium (265)	111 Rg Roentgenium [272]	Copernicium	113 Uut Ununtrium unkitown	114 Fl Flerovium 12251	LIS Uup Ununperitium unknown	116 LV Overmonum [296]	117 Uus Ununseptium unknown	L18 Ununoctium unknown
Lanthan Series Actinid Series	s Lantha 1383 de ∧	anum Cen 306 90 C T	h Praseco 115 91 h Protac	a <sup>92</sup>	mium Prom 134 14 93	ethium Sam 1913 94 Ip P	atium Eun 0.16 95 Pu A	1966 Gado 1966 19 96 .m C	1725 Ter 19 97 m E	sizs Dyspi sizs 16 98 Sk Calife	Ef Einst	rium Eri 100 ES F	international in	102 11 102	rbium Lute 104 17/ 103 JO L selium Lawre	LU estum 1967
		Alkali Metai	Alkalin Earth	e Trans Me		Basic Metal	Semimetal	Nonmetal	Halog		ias L	anthanide	Actinide		© 20	14 Todd Heimenstine sciencenotes.org

Nitrogen makes up 78% of the atmosphere

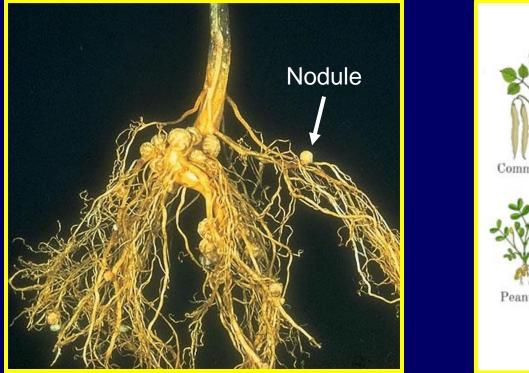
Atmospheric Nitrogen consists of two nitrogen atoms bonded together to form the nitrogen molecule, N<sub>2</sub>.



Most organisms cannot break that triple bond, in order to use the nitrogen atom.

Both plants and animals breathe in nitrogen molecules, N<sub>2</sub>, and breathe them right back out again.

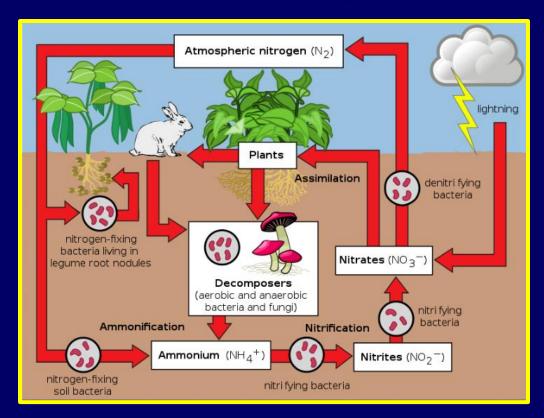
The only organisms that are capable of breaking apart a nitrogen molecule, N<sub>2</sub>, into individual atoms of nitrogen, are nitrogen fixing bacteria that live in nodules on the roots of legume plants.





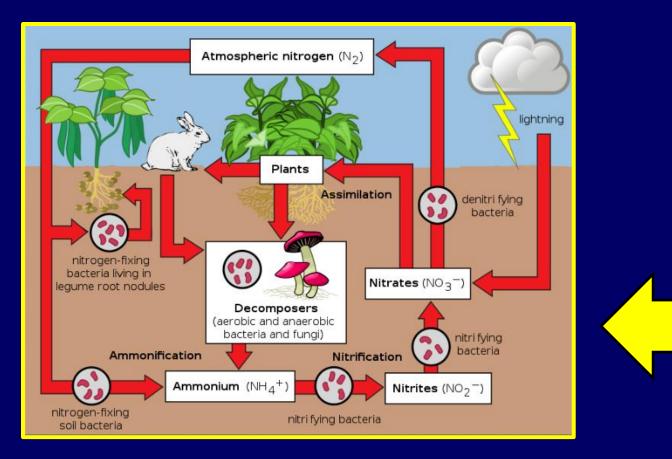
### **Nitrogen Fixation**

Nitrogen fixing bacteria break apart atmospheric nitrogen (N<sub>2</sub>) and chemically combine the nitrogen atoms (N) with hydrogen atoms (H), to form ammonium molecules ( $NH_4^+$ ).



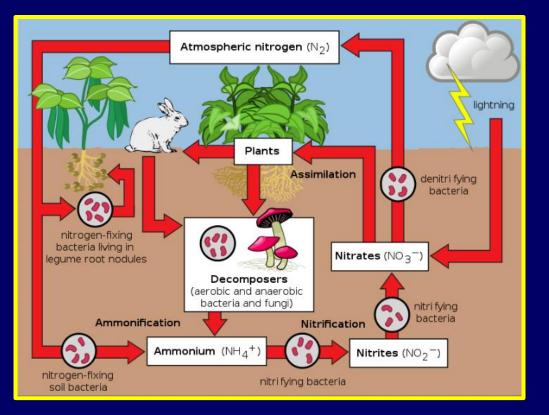
#### Nitrification

Other bacteria then chemically combine ammonium molecules (NH<sub>4</sub>+) with oxygen molecule (O<sub>2</sub>) to form nitrites (NO<sub>2</sub><sup>-</sup>) and nitrates (NO<sub>3</sub><sup>-</sup>).



#### **Protein and DNA**

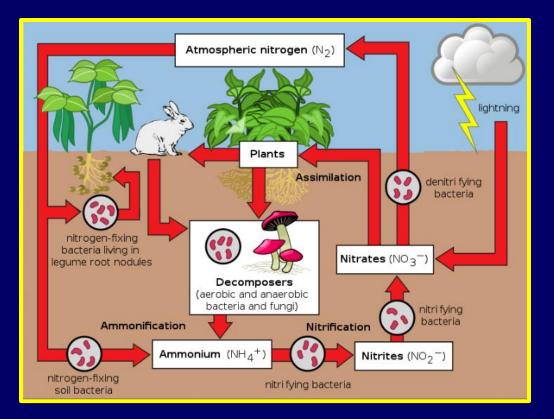
Plants take up nitrites  $(NO_2^{-})$  and nitrates  $(NO_3^{-})$  from the soil and use it build DNA and proteins molecules.



Animals obtain nitrogen, in order to make their own DNA and protein molecules, by eating plants or by eating other animals that already ate the plants.

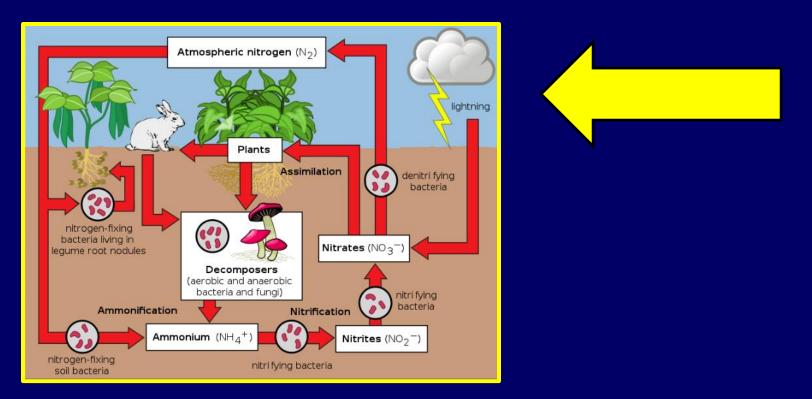
#### Denitrification

When plants shed their leaves or die and when animals excrete wastes or die, decomposers break down the wastes and return the nitrogen to the soil.



Denitrifying bacteria, in anaerobic soil, then return the nitrogen to the atmosphere.

While most of the nitrogen cycle is driven by various types of bacteria, lightning can also covert atmospheric nitrogen (N<sub>2</sub>) into a form that plants can use.



#### **Inorganic Fertilizers**

Lawns and crops that are not legumes, nor rotated with legumes, rely upon the constant addition of inorganic fertilizer.





# The End

