Nitrogen compounds

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Content

- ★ What are nitrogen compounds?
- ★ Where does nitrogen come from?
- ★ Nitrogen in fertilizers used for agriculture
- ★ How much nitrogen is in the water we tested?
- ★ How does nitrogen react with water?
- ★ What are the effects of nitrogen being present in water?
- ★ How can we control nitrogen compound concentration in water?
- ★ Which water purification methods can be used to remove nitrogen from water?
- ★ What can an individual person do to try to reduce nitrogen?
- ★ Conclusion

Where does Nitrogen come from?

- agricultural processes;
- fertilizers and pesticides;
- industries;
- *liquid nitrogen is applied in large amounts to freeze food;*
- *domestic waste water.*

Nitrogen fertilizers used in agriculture

- ★ Ammonia (NH_3)
- ★ Haber-Bosch
- ★ Good crops growth
- ★ Leaching of nitrates

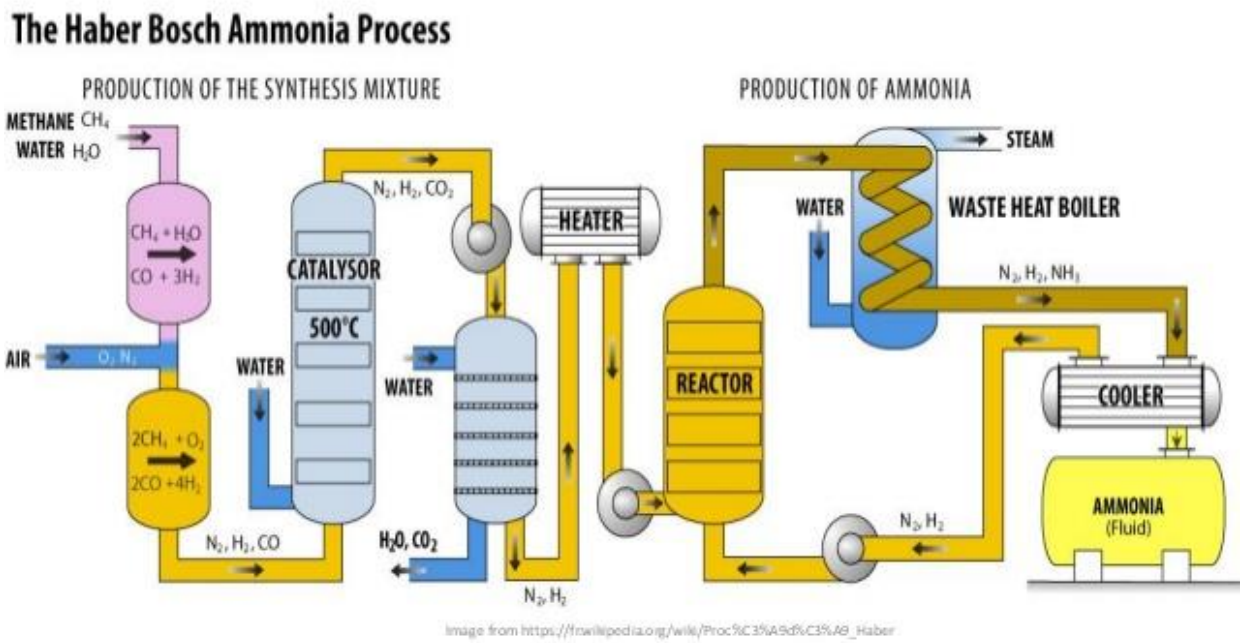
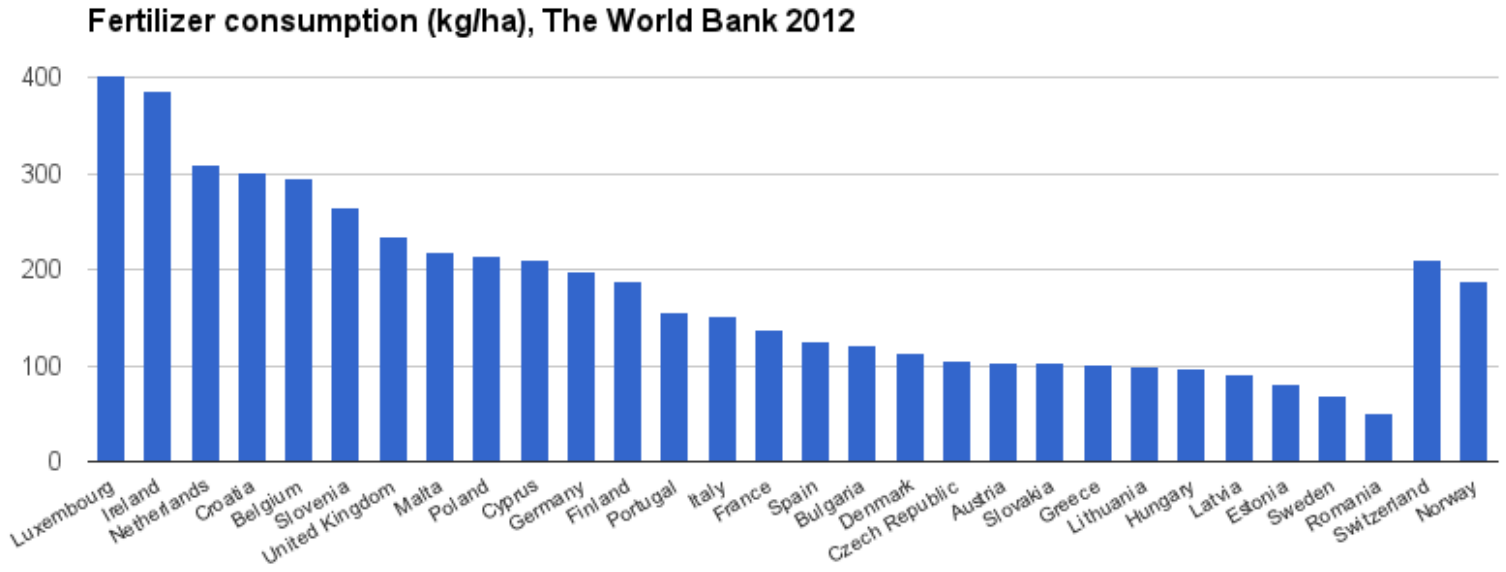


Image from https://frwikipedia.org/wiki/Proc%C3%A9d%C3%A9_Haber

What we expected to find

- ★ The Netherlands and the UK
- ★ Sweden



Fertiliser consumption per hectare of fertilised UAA, EU-28, 2007 and 2017

	2007			2017		
	Fertilised UAA (1000 ha)	Nitrogen/Fertilised UAA (kg N/ha)	Phosphorus/Fertilised UAA (kg P/ha)	Fertilised UAA (1000 ha)	Nitrogen/Fertilised UAA (kg N/ha)	Phosphorus/Fertilised UAA (kg P/ha)
EU-28	157 739	67.9	9.4	152 648	75.9	8.8
Belgium	1 346	106.0	7.4	1 320	118.2	3.7
Bulgaria	4 968	35.8	2.6	4 352	80.7	6.8
Czechia	3 565	94.0	7.5	3 486	114.1	6.9
Denmark	2 508	77.6	5.6	2 576	98.2	8.1
Germany	16 171	98.9	7.1	16 297	101.8	6.2
Estonia	897	27.8	3.9	961	38.8	4.2
Ireland	3 831	83.9	8.5	3 583	103.0	11.7
Greece	3 226	73.2	10.2	3 133	61.3	9.0
Spain	16 745	58.9	14.5	16 743	64.0	11.4
France	26 933	81.6	9.0	26 799	83.9	7.0
Croatia	1 176	110.9	15.0	1 040	94.6	14.3
Italy	13 073	45.2	17.5	11 353	50.8	20.2
Cyprus	133	61.6	14.8	112	72.3	21.0
Latvia	1 240	37.2	5.9	1 472	52.6	7.7
Lithuania	2 588	49.1	6.6	2 833	59.0	8.3
Luxembourg	130	102.8	5.7	131	103.6	3.9
Hungary	5 197	61.5	7.3	4 567	90.9	10.8
Malta	10	61.3	6.2	11	51.5	5.1
Netherlands	1 845	130.1	8.0	1 731	128.8	2.7
Austria	2 344	47.3	7.7	2 182	51.3	5.4
Poland	14 954	70.6	12.0	14 021	82.1	10.7
Portugal	2 069	54.6	14.4	2 001	50.7	11.2
Romania	12 551	21.2	3.6	12 450	30.6	5.1
Slovenia	448	66.0	12.4	417	64.9	9.6
Slovakia	1 868	60.6	5.9	1 844	66.5	5.5
Finland	2 008	74.1	8.0	1 997	69.6	6.1
Sweden	2 794	59.8	4.9	2 800	70.9	5.2
United Kingdom	13 119	76.8	7.5	12 364	84.1	7.0
Norway	881	120.8	13.6	823	120.7	10.5

Note: Fertilised UAA is calculated by excluding from UAA the hectares occupied by rough grazing and fallow land. As there are no data available for 2017 yet, 2013 was chosen as reference year for rough grazing and fallow land. EU28, Italy and Norway: 2016 values of UAA were used to calculate the fertilised area, because there are no data available for 2017.

Source: Eurostat (online data codes: aei_fm_usefert, apro_cpsh1 and ef_oluft)

How much nitrogen is in the water we tested?

	pH paper	pH reading		Red cabbage	
Italy	7		7.1\7\6		4
Holland	7		7,2		1
Germany	7		6,2		5
UK	7		7,5		2
Finland	6		7,5		6
Sweden	6		7,2		3

	Method 1 (mg\l)			Method 3	
Nitrate	nitrate	nitrite	Method 2	Nitrate	Nitrite
Italy	10-25/0-10	0	2\1	100	0,18
Holland	10	0	2	106	
Germany	25-50	0	5	75	0,54
UK	10	0	0	less than 140	0.08
Finland	15	0	0,5	70	
Sweden	10-25	0	0	88	13,5

Ammonium	1 Method
Italy	0
Holland	0
Germany	0
UK	0
Finland	0
Sweden	0

How does nitrogen react with water?

NItrogen itself, in its diatomic (N_2) form does not react with water. However, nitrogen containing compounds, commonly found as impurities in untreated water, in large quantities can have negative effect in overall state of water.
When nitrogen-containing fertilisers are mixed with water, they dissolve into ions, one of which is nitride (NO_3^-) ion. There is a danger, that those ions, when they are inside the human body, are transformed into nitrite (NO_2^-) ions. Overabundance of those ions in human body leads to a variety of health problems.
Ammonia-containing compounds and nitrogen oxides negatively affect the PH-scale of water.

key points
Nitrogen-containing compounds have negative effect on overall quality of water.
These compounds dissolve into NO_3^- ions in water and transformed into dangerous NO_2^- ions in human body.

What are health effects of nitrogen compounds being present in water?

Too much nitrogen compounds in drinking water can be harmful to children or young livestock.

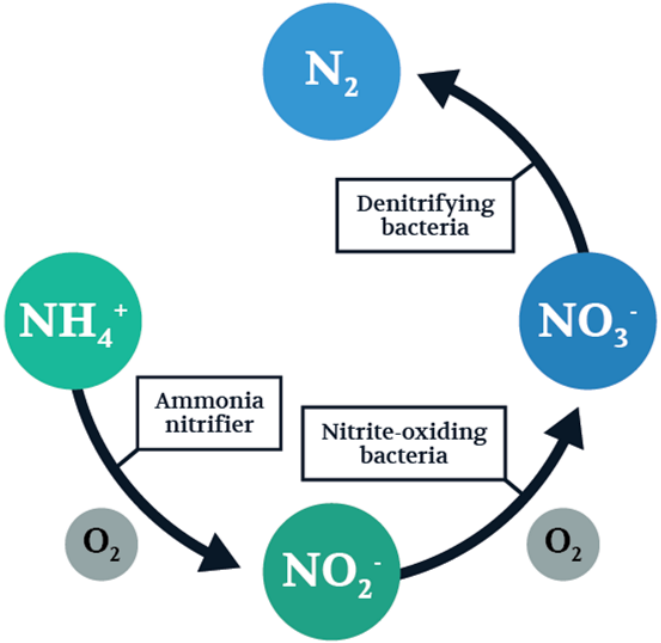
Children under the age of 4 months are unable to repair themselves as they lack the protein needed, and so they develop methemoglobinemia. ("blue baby syndrome).

What are the environmental effects of nitrogen compounds being present in water?

Excess nitrogen can cause overgrowth of aquatic plants and algae. Excessive growth of these organisms use up dissolved oxygen as they decompose and block light to deeper waters. This produces scums of algae on the water surface which can occasionally result in the death of aquatic life and can even deprive a lake of all of its oxygen.

Which water purification methods can be used to remove nitrogen from water?

- ★ Step 3
- ★ Nitrification
- ★ Denitrification
- ★ Stripping method
- ★ Ion exchange



Reaction route of conventional nitrification and denitrification

How can we control nitrogen compound concentration in water?

Industrial and commercially available ways of water filtration.
Those techniques and devices are aimed to get rid of all kinds of impurities, including nitrate ions, fluorite, chlorides, ammonia, pesticides, heavy metals etc.
The are two main ways of water filtration:
1. Reverse osmosis systems (main industrialized way of purification)
2. Special filters with selective anionic ion exchange materials (Using ion-exchange resin)

Ways of separation

Filters with selective anionic ion exchange are mostly used in household environment. They are using different kinds of ion exchange resins to further clean out industrially cleaned water. There is some evidence, that amount of resin, capable of filtrating ions is decreasing with use and can be a reason of formation of harmful nitrate ions.

Reverse osmosis is mostly used in industrial purification for all applications, including the purification of drinking water. The water is pumped under high pressure through partially permeable membrane, which separates water from waste. The result product has more than 95% of impurities removed. However, there is a controversy, that this method also removes some of the beneficial minerals, such as calcium or magnesium. There is also the problem of dealing with waste concentrate of the process, containing all of those impurities. After the cleaning process, the concentrate is treated at the other plant (already using petrol and damaging the environment with emissions), they are dumped into the ocean. There is a need to find the way of destroying waste effectively and with less pollution, which puts nitrogen-containing compounds into the environment.

What can an individual person do to try to reduce nitrogen?

- ★ Drive less
- ★ Don’t use fertilizers

Conclusion

-heard about the effects of nitrogen
-in the future try to improve the quality
-try to control the Agriculture
-Improve the filtration of the water and research other methods
-Individual persons try to buy unpolluted bio vegetables
-Aim in the next years reduce the nitrogen concentrarion
-also to sensitize people


thank you
danke
謝謝
ngiyabonga
рахмат
teşekkür ederim
Баярлалаа
спасибо
gracias
tapadh leat
dank je
misaotra
matondo
paldies
grazzi
mahalo
хвала
asante
manana
obrigada
tenki
murakoze
chokrane
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dankie
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bedankt
hvala
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kszönöm
dankon
akun
ačiū
enkosi
bayarlalaa
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dhanyavadagalu
shukriya
mercè
мерси
diolch
তোমাকে ধন্যবাদ
감사합니다
xièxie
merci
ευχαριστώ