

Nitrogen Filter Invention concept disclosure

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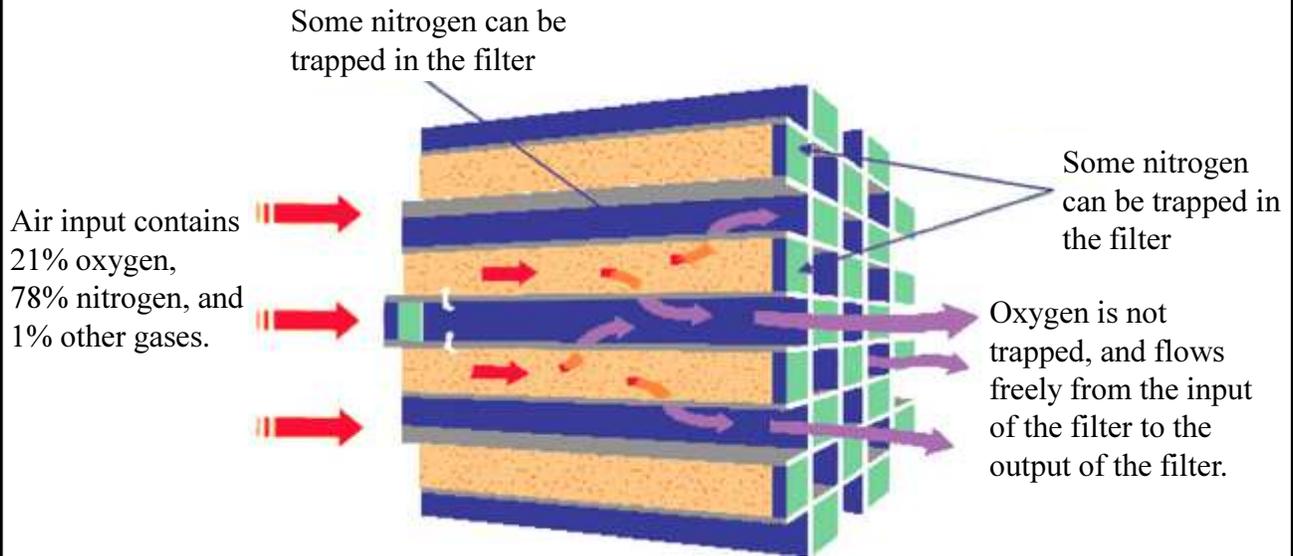
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Confidential Information

Invention concepts

Nitrogen Filter Concept



Result: The filter functions as an OXYGEN CONCENTRATOR, providing a higher concentration of oxygen in the output of the filter.

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Applications

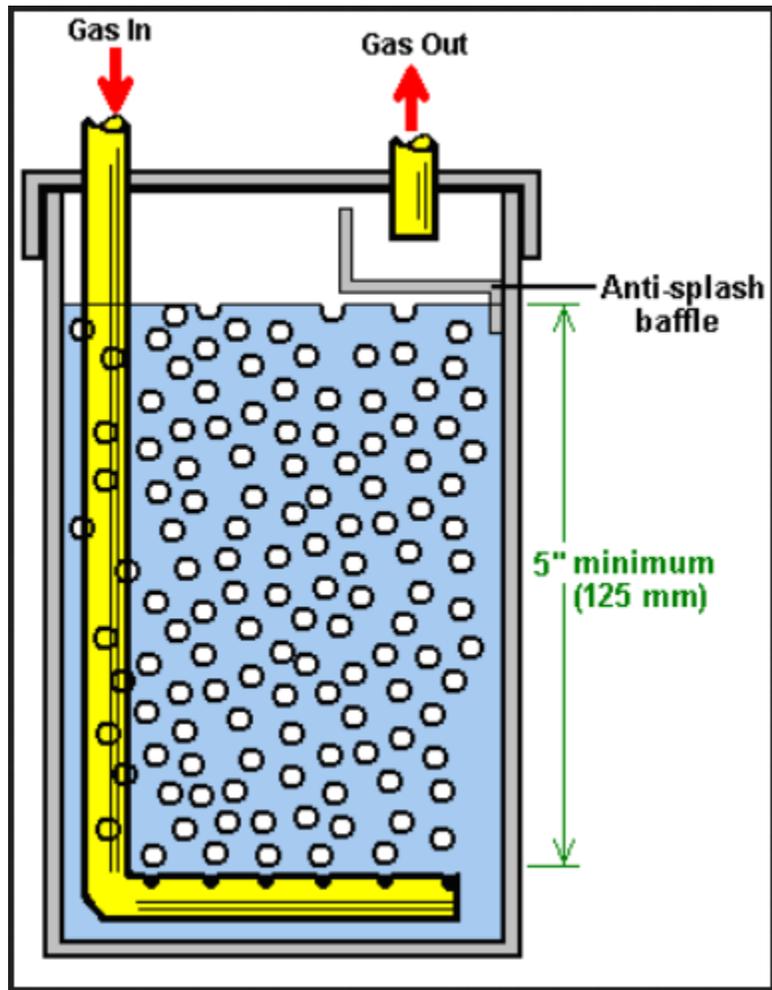
Respirators for divers and firemen
Oxygen concentrators for COPD patients

Features

Lower cost than mechanical oxygen concentrators.
More reliable; no electrical power needed.
Lighter weight than mechanical systems.

The previous page shows an all-solid-state filter.

Below is shown a liquid-phase filter. that can use liquid chemical reactions to sequester the nitrogen.



This embodiment can use liquid chemical reactions to sequester the nitrogen, and allow the oxygen to flow to the output. The size can be much smaller than the unit shown in the above figure.

The filtered air can deliver oxygen-rich air to the human using standard methods

with a cannula

SALTER DUAL FUNCTION OXYGEN DELIVERY CANNULA



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or, with respirator masks



Appendix A -- How nitrogen is removed from air; SOTA



Forums > Homework Help > Engineering and Computer Science Homework >

Homework Help: How do I remove nitrogen from air?

When you cool gases they turn into liquids - just like when you heat liquids they turn into gases (for example boiling water to make steam) To turn air into a liquid you have to cool it a lot (-196°C / -320°F), this takes a serious piece of industrial equipment. Then because nitrogen and oxygen turn into liquids at different temperatures you can heat the liquid air up until one of them (oxygen first) boils off, you are then left with nitrogen, as chroot described. This is called distilling and is exactly the same process as boiling off water to keep the alcohol when making whiskey - that's why they are called distilleries. On a small scale you could also find some chemical that reacts with nitrogen but not oxygen and have that 'use-up' all the nitrogen in a sample, leaving just the oxygen. I can't think of anything suitable - most things react with oxygen better than with nitrogen.

Reference <https://www.physicsforums.com/threads/how-do-i-remove-nitrogen-from-air.242317/>

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[https://info.inogen.com/brand.php?num=855-216-](https://info.inogen.com/brand.php?num=855-216-6665&campaign=SEMGB_INO&adid=290934857684&kw=portable+oxygen+machine&pmt=b&gclid=EAlaIqobChMIkSt8ZKk3QIVCL7ACh21xw9CEAAYASAAEgLa0fD_BwE)

[6665&campaign=SEMGB_INO&adid=290934857684&kw=portable+oxygen+machine&pmt=b&gclid=EAlaIqobChMIkSt8ZKk3QIVCL7ACh21xw9CEAAYASAAEgLa0fD_BwE](https://info.inogen.com/brand.php?num=855-216-6665&campaign=SEMGB_INO&adid=290934857684&kw=portable+oxygen+machine&pmt=b&gclid=EAlaIqobChMIkSt8ZKk3QIVCL7ACh21xw9CEAAYASAAEgLa0fD_BwE)

THE BENEFITS OF PORTABLE OXYGEN

Oxygen provides many benefits, and now with portable oxygen concentrators, you can reclaim your freedom and independence.

- + Capable of full 24/7 oxygen delivery
- + Jump in the car to run errands
- + Take a weekend trip to see family
- + Comes with carry bag & user manual
- + Packages with additional accessories are also available





Philips Respironics
SimplyGo Mini

- Designed for active lifestyles
- Extended 9 hour battery life
- Lightweight + 5 dose settings
- Extended 3 year warranty



AirSep Focus Portable

- Smallest Concentrator
- **Only 1.75 pounds**
- 2 Micro-batteries (3 hr. llife)
- Extended 3 year warranty



Philips Respironics
SimplyGo

- Continuous Flow or Pulse Settings
- 3.5 hour battery life
- 10 lbs. - Carried or Carted
- Extended 3 year warranty

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https://info.usoxygensales.com/?gclid=EAIaIQobChMIkbSt8ZKk3QIVCL7ACh21xw9CEAAYAiAAEgJaDvD_BwE

Oxygen concentrators are expensive

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**** Inogen One G3, 2018 Model - All Day Freedom Sale! Oxygen Flow 1 to 5 - Freedom Package - Inogen G3 - Portable Oxygen Concentrator System - Light-Weight & Long Battery Life - Free Over-Night Delivery on Next-Day FedEx!....Don't Miss This Sale!**

**Freedom Sale Price:
\$2,295.00**



****Inogen High-Flow Oxygen Model - Quietest Inogen Ever Made - Settings 1 to 6 - Light-Weight & Long Battery Life - With Free Overnight Delivery on Next-Day FedEx! Don't Miss This Sale!**

**Freedom Sale Price:
\$2,695.00
FedEx**



****Inogen One G4, 2018 Model** Rated #1 in Portable Oxygen & Only 2.8 pounds and Half The Size. You can wear it! Free Overnight Delivery on Next-Day FedEx!...Don't Miss This Sale!**

**Freedom Sale Price:
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Appendix B-- Nitrogen filter technology exists

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From Travis Arbogast <travis@criticalprocess.com> ☆
 Subject **Critical Process Filtration**
 To hp@valliant.net ☆
 Cc Nicole Carpentiere <ncarpentiere@criticalprocess.com> ☆

Email received
 Aug 5, 2018
 9:34 AM

Hi Howard,
 Thanks for reaching out to Critical Process Filtration, unfortunately the filter cartridges we manufacture would not be able to remove or reduce nitrogen in an air stream. They'd mainly be used to remove any particles that were present in the air stream. I'm sorry we couldn't be of more help, but please let me know if you have any other projects you may need filtration and I'd be happy to take a look, I've attached our line card which has the products we manufacture for reference.

Thank you

[Travis Arbogast](#)
[Sales Support](#)
[Critical Process Filtration](#)
[Phone: \(603\) 880-4420](#)
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3M offers innovative advanced depth filter systems and membrane-based separation media for chemical pharmaceutical manufacturing. Review our products here.

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REPORT TO THE
PUGET SOUND ACTION TEAM

NITROGEN REDUCING TECHNOLOGIES FOR ONSITE WASTEWATER TREATMENT SYSTEMS

<https://www.doh.wa.gov/Portals/1/Documents/Pubs/337-093.pdf>

Appendix C -- Nitrogen gas filters are expensive

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GLOBAL FILT. / PARKER

NITROGEN GAS FILTERS

<p>KIT2050108-303 \$11,412.50</p>	<p>Nitrogen Gas System Filter KIT2050108-303 (Element) Microfiltrex Part number: Superceded to PN Parker Air and Fuel P/N: KIT2050108-303</p>	<input type="text" value="1"/>	<input type="button" value="ADD TO CART"/>
<p>KIT2050118-301 \$2,815.00</p>	<p>Nitrogen Gas System Filter KIT2050118-301 (Element) Microfiltrex Part number: Superceded to PN Parker Air and Fuel P/N: KIT2050118-301</p>	<input type="text" value="1"/>	<input type="button" value="ADD TO CART"/>

<http://www.globalfiltration.com/products-1/global-filtration-parker-hannifin/nitrogen-gas-filters?Page=2&Items=12>

R&D Challenge -- develop nitrogen filter technology

The current state of the art for oxygen concentrators is that nitrogen is removed from air using expensive cryo-distillation methods. For more information, please see [Appendix A -- How nitrogen is removed from air; SOTA.](#)

Some nitrogen filter technology exists. For more information, please see [Appendix B-- Nitrogen filter technology exists.](#)

Currently, nitrogen gas filters are expensive. For more information, please see [Appendix C -- Nitrogen gas filters are expensive.](#)

Summary: A low-cost, simple nitrogen filter is needed, and can be the goal of a research project beginning with the concepts described in this document.

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Technical Collaboration is invited.

Contact information for engineers and chemists; and product development specialists:

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