

AN OVER VIEW OF POLLUTION CONTROLLING T-SHIRT IS THE FUTURE OF SECURE ENVIRONMENT.

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Abstract

Pollution is a major problem for our health and it is very difficult to escape. We breathe polluted air in every place we go: streets, cars, homes, offices, schools, and that is the cause of many deaths and health problems. What if we could leverage our clothing to clean air from pollution? Can our favorite t-shirt save the world from pollution?

This is the question we started from. RepAir a genderless t-shirt that absorbs the NO_x and VOC equivalent to those produced by 2 cars.



How it works?

RepAir works with zero-impact and doesn't need any external energy source. Its pocket, made of an antibacterial and breathable fabric, incorporates the Breath®, a patented material capable of separating, absorbing and retaining NO_x, SO_x, VOC, Ozone, PAH, Benzene and other pollutants and bad odors in the air.



The air flows through the pocket into the insert and pollutants and bad odors are captured and contained in the insert (but, rest assured, your t-shirt will not smell as organic molecules are disaggregated).



1.How does t-shirt work?

Kloters RepAir is equipped with an antibacterial pocket that contains an insert of the Breath®, a fabric patented and tested by Anemotech, according to UNI 11247, ISO 16000-9 and ANSI / AHAM - 1- 2015 standards. The Breath® fabric is composed of three layers. The outer layers, antibacterial and printable, filter the polluting molecules and the bad smells that are trapped by the internal, nano molecules activated core. The RepAir insert is capable to neutralize various pollutants present in the air, including NO_x, SO_x, Ozone, Benzene, Formaldehyde, VOCs and Polycyclic Aromatic Hydrocarbons, responsible for various health problems including tumors, leukemia, respiratory diseases, ocular and nasal irritations. Kloters RepAir also traps and neutralizes organic molecules responsible for bad odors, helping to improve the air breathed in all its dimensions.

Kloters RepAir does not require external energy sources, but works with the natural air flow through the pocket containing the Breath® insert.

2.What energy source does t-shirt need?

RepAir is zero impact. It requires no energy but works with the natural flow of air through the Breath®, the insert contained in the t-shirt pocket.

3.How is the t-shirt insert made?

The RepAir insert is made of a fabric produced by Anemotech, the company which partnered with Kloters in the RepAir project. The insert consists of 3 layers. The outer layers, are made of an antibacterial and printable fabric, that facilitates the air transpiration. The central core, is a nano molecules activated material, that filters the polluting substances and the bad smells. This core, the heart of the Breath, is capable to trap and disintegrate various pollutants present in the air, including NO_x, SO_x, Ozone, Benzene, Formaldehyde, VOCs and Polycyclic Aromatic Hydrocarbons, responsible for various health problems including tumors, leukemia, respiratory problems, eye and nasal irritation. The insert also acts and breaks down the molecules of organic nature responsible for bad odors, helping to improve the air breathed in all its dimensions.

4.How was the absorption power of RepAir estimated?

Absorption tests for the Breath® were carried out by the SIMAU Department of Università Politecnica delle Marche. The tests were performed on a 64 cm square Breath sample, according to the UNI, ISO and ANSI standards, in particular:

- ISO 16000-9: laboratory test method for determination of the area specific emission rate of volatile organic compounds (VOCs) from newly produced building products or furnishing under defined climate conditions

- UNI 11247: test for the determination of the degradation of nitrogen oxides in the air by inorganic photocatalytic materials

- Test ANSI/AHAMAC-1-2015: standard method for measuring specified product characteristics of household portable air cleaners.

Absorption test results are shown in the table on the campaign tab, and showed absorption up to 97% for VOCs, up to 92% for Formaldehyde and SO₂, up to 87% of NO_x and up to 62% of Benzene.

The absorption values measured in the laboratory were then compared with the emissions data measured in the center of Milan and with ACI (Automobile Club Italia) data on car emissions, to calculate the number of cars whose pollution is estimated to be absorbed by RepAir. The model created estimates by projection that each RepAir t-shirt exposed to polluted air for a day is capable, thanks to the Anemotech's the Breath® insert, to absorb 1½ times the Volatile Organic Compounds produced by a gasoline car and half of the NO₂ produced by a diesel car in the same period.

5.What positive effects does RepAir have on the air we breathe?

The substances that RepAir retains and disintegrates thanks to the use of the Breath® fabric are the cause of various health problems for humans, including tumors, leukemia, respiratory diseases, ocular and nasal irritations. Kloters RepAir also traps and neutralizes organic molecules responsible for bad odors, helping to improve the air breathed in all its dimensions. RepAir acts in a virtuous way both indoor and outdoor and the insert keep working even when removed from the t-shirt (for example to wash it)

6.Is RepAir harmful for those who wear it?

RepAir is not harmful to the wearer. Pollutant molecules are disrupted and trapped by the core of RepAir insert and made inactive. In addition, the core of the insert, the technology that breaks down the polluting molecules, is enclosed and separated by external contact by a layer of antibacterial fabric and contained in a small pocket made of the same material that can be accessed through a micro zip.

7.As RepAir absorbs bad odors does it smell?

No it doesn't. Organic molecules responsible for bad odors are disaggregated and trapped into RepAir core, leaving the air fresh and clean.

8.Can RepAir be washable and ironed?

RepAir t-shirt is washable and ironed like a normal t-shirt, but not the Breath® insert that can be easily extracted through a micro zip before washing. The insert can be reinserted after ironing the t-shirt.

9.Can a t-shirt change the world?

Maybe not a single t-shirt, but many probably so. If RepAir is worn for a day, it is estimated to offset the pollution produced by two cars in the same period. About 2 billion t-shirts are sold worldwide each year (www.huffingtonpost.com). It is easy to imagine that even if a small part of these were RepAir (especially in the most polluted cities), the impact could be significant. This is what we mean by sharing ecology, using the network effect to multiply the small and simple use of a t-shirt. By trapping some of the molecules responsible for the formation of Particulate Matter, RepAir, when used at scale, would also help to reduce the need for measures such as traffic control measures.

10.How long does the absorption capacity of the RepAir insert last?

The insert has an absorbing capacity of about 12 months if exposed continuously to the air. To maintain the effectiveness of RepAir, Kloters recommends replacing the insert every year. New inserts will be available and purchased separately at www.kloters.com. For those who wish, you can leave your data when purchasing RepAir and you will receive an alert when the insert approaches the end of its life.

11. Can I throw the RepAir insert into normal garbage?

The Breath insert must be disposed according to the directives in force in your region for special waste. It is possible to deliver the used inserts in Kloters stores or send them directly to Kloters who will dispose of them in the appropriate manner.

12. Is the insert heavy?

No. The insert has the weight and consistency of thick neoprene-like fabric. We have worked to integrate it seamlessly into the pocket to make the t-shirt as comfortable as a standard t-shirt. We tested various samples of the t-shirt in many conditions (including very warm weather) and we believe you will forget to have the insert in the pocket after few seconds you wear RepAir.

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