

10 Fundamentals Of Air Purification That Could Save Your Life

Watching the horrors of the fires in California is making more people than usual think about air quality and what to do about it in an emergency situation.

Some of these people don't realize that there is already unfolding crisis when air quality problems appear in the United States.

As asthma and other breathing related problems skyrocket, the question of how to purify air may become crucial. Learn how to purify the air in the event of some other crisis such as a major fire, gas, nuclear, or disease based crisis. Consider both DIY and pre-manufactured options to survive poor air quality.

Here are the ten things you should always keep in mind on this topic.

Finding Out What Needs to be Filtered Now

Before you start buying air purifying systems, find out what you need to filter out, following:

How much dust and "large" sized particulate is in the air? If you can see a haze of dust, then you will more than likely need at least a MERV 5 or 6 prefilter in front of any other filter that you decide to buy for your system. (MERV is an acronym that stands for Minimum Efficiency Rating Value.

The higher the number after the MERV designation, the smaller

the particles and greater percent of them the filter is capable of removing from the air. 3M and some other brands use the MERV rating while other manufacturers use different designations. In all of them, the higher the number, the better the filter.)

How much pollen, mold, and mildew spores are in the air? You will either need to build an Arduino unit for detecting particles this size and slightly smaller, or purchase a pre-manufactured meter for this purpose. While it takes some effort to learn how to assemble and program Arduino boards, they are also very versatile.

This means you can add different kinds of sensors to the board at a fraction of the cost of buying them separately. When it comes to detecting gasses and toxins, you will find that Arduino controllers are truly your best and most affordable option.

If you are looking specifically for mold and mildew, you can also purchase testing strips or kits that can be used to capture spores from the air. After you collect these samples, you can send the kit off to the lab to find out what kind of microbes are present.

While these kits are highly specific insofar as what is actually in the air, they are not reusable. In addition, no matter what kind of mold or mildew you have growing in your home, the methods for getting them out of the air will be the same.

Since the Arduino system or a pre-manufactured sensor will alert you to the presence particles in the appropriate size range, this may be all you really need to know at this stage.

How much automobile exhaust, methane from waste dumps, and other chemicals are in the air. In order to detect these gasses, you will need to build your own sensors using an Arduino board. Sadly, even a single device for a single gas

can cost several hundred dollars pre-assembled.

By contrast, you will not spend more than 100.00 between the Arduino main board and an array of sensors that will cover most of the gasses that may be in the air right now.

Know What Air Quality Issues that May Occur During a Crisis

No matter how bad the air quality may seem right now, it can get much worse during a major crisis. Consider that there are several cities in or near the major fires burning in California. Even though the residents of these areas are accustomed to high levels of smog and other forms of air pollution, the addition of the smoke from the fires is causing many to evacuate.

In a similar fashion, even if you live in a rural area, or some place else with better air quality, there is a chance that a major fire would either force you to evacuate or attempt to clean the air. Without a question, if you are determined to bug in, or build a survival shelter, then concerns about smoke from fires would be one main reason for focusing a good bit of attention on air purification.

Here are some other crisis related scenarios that would require a good air purification system:

Nuclear attacks where you must be able to filter out dust and other debris. Since some of the dust may be smaller than pollen or other very small particles, you should be prepared to install at least a MERV 7 prefilter in front of others in the array, and then follow that with a MERV 14.

Remember, during normal operations you may only have one pre-filter in your system, but during a major crisis, a set of washable and reusable pre-filters will be very important when it comes to prolonging the life expectancy of the higher rated

filters sitting behind it.

Gas or other chemical attacks. Unlike pollen, dust, or other forms of debris, it is not possible to filter out gasses by using progressively smaller holes in a filter. Instead, you will need to use activated carbon or some other material that is capable of locking these gasses into the pores of the material. For gas attacks, as well as most kinds of chemical pollution, you will need filters impregnated with activated carbon.

Biological warfare or germ attacks. Getting these pathogens out of the air can be very difficult. You will need at least a MERV 12 filter for the innermost layer of filters, or go as high as a MERV 14 or 15. Since most hospitals use MERV 14 and above for air based pathogen control, this would be a good choice.

Just remember, however, once you go past MERV-13, even in a home built air purification system, the reduction in air flow may be enough to reduce the overall effectiveness of the system. If you are going to use higher than a MERV-13, set aside just one or two units, and leave the ones with lower level filters for increasing air circulation.

Must Have Sufficient Air Flow

Did you know that the biggest problem in most homes is the lack of good air flow. While you may be constantly trying to block off air leaks for the sake of improving heat efficiency, the actual air quality in the house is always going to be lower than what is outdoors.

[This Device Easily Turns Air Into Water!](#)

By the time you factor in pollution buildup from various fumes, odors from normal household activities, and imbalances in humidity, controlling internal air quality may seem

impossible. On the other side of the equation, the hidden secret to most of these problems is as simple as improving air flow throughout the building.

Today, many people mistakenly believe that dedicated air purifiers, electrostatic systems on the central air system, and even de/humidifiers can all do the job without blowing lots of air around the rooms. This, in turn leads to a situation where most people give up on these expensive systems because they see little or no benefit.

Interestingly enough, the average pre-fabricated air purifying system only puts out between 100 and 500 CFM. As you can see from the [tables](#) in these [links](#), that may be enough to filter air in small rooms, but it may not be enough for survival needs let alone modern heavily polluted homes.

By contrast, the average box fan puts out a whopping 2500 CFM, which means that pairing it with the right filters will give you a much better solution.

Filtering out Toxic Gasses

As noted earlier, MERV ratings, and to some extent, even a robust air flow won't do much when it comes to getting rid of toxic gasses. While increased air flow can make the gasses easier to dissipate, you will still need something else to

capture the gases.

FIND OUT YOUR AIR FILTER'S MERV RATING



1-4

pollen, dust mites



5-8

mold, dusting aids



9-12

lead dust, bacteria



12+

all bacteria,
tobacco smoke

Typically, [activated carbon](#) will offer you the ability to filter out the widest number of volatile organic compounds (VOCs) and other toxic gasses. These filters are also readily available in disposable form and will last for about three months.

For an added layer of purification, you may also want to experiment with the polymers and other materials that are used in gas masks. In this case, you will need to get ahold of the filter media and then figure out how to make it into a suitable filter.

Remember, when it comes to filter efficiency, the size of the filter is every bit as important as the speed of air moving through it. A 10" x 10" filter may work just as well as a 20" x 20", however the smaller filter will fill up faster and either excessively impede air flow or become unable to retain gasses.

Dust, Pollen, and Mold

When you go to the store and look at different kinds of filters, you may be led to believe that the biggest filter will always remove the most particles. There is, however, a second part to MERV and other efficiency ratings.

Essentially, just because a filter will trap some smaller particles, that doesn't mean it will remove every particle in that size range that encounters the filter. As a result, you will find that a MERV 8 or above will be rated for filtering out pollen, however it may only remove 50% of those particles.

By contrast, a MERV 12 may remove well over 80%.

This is just one of many reasons why working with pre-filters is so important when it comes to creating a viable air purifying system. Since you can easily find lower MERV rating filters in the washable and reusable forms, it is best to use

those as pre-filters so that you can extend the lifespan of the higher capacity disposable ones behind it.

Meters and Gauging Success

Once you build a series of meters for detecting indoor air quality issues, you should continue to use them to see if your system is actually working. While some people will go by changes in how they feel, measurements are still very important for managing a crisis.

A nuclear bomb, a fire, or some other crisis generating event can cause air quality to decay faster than expected. In these situations, you will need the meters to tell you when it is safe to remove gas masks, as well as to gauge how well the system is doing with managing the crisis.

If you keep a good recording of readings on a daily basis, you will also have a chance of estimating the systems effectiveness in other situations. As an added bonus, if you continue to measure the air quality after the system is built, it gives you a chance to improve efficiency as well as to test out different products to see which ones work best for your situation.

Recycling and Rehabbing Used Filters

Pleated filters offer the best in terms of filtering out particles from the air, but it can be both expensive and difficult to obtain pleated media in a time after a major social collapse. This is just one of many reasons why you need to learn as much as possible about rehabbing and extending the life of both disposable and permanent air filters.

The main problem with extending the life of pleated filters is they can become a source of microbe contamination. They can

also build up quite a bit of mold and mildew as the spores are captured in the filter. If you can find a chemical that won't ruin the pleated material, but will kill off the micro organisms, it may help you extend the life of each filter.

As with water filters made with activated carbon, it may also be possible to rehab the carbon in air filter media. Failing that, you should know how to make your own charcoal, and then add it to a cleaned up pad based filter.

Remember that these filters can also be a breeding ground for mold and mildew. You will need to make sure you can thoroughly clean them in order to avoid this problem.

Providing Power for Air Filters

A standard box fan is likely to take less electricity than a conventional air purifier. Sadly, when you have no electricity at all, the fans will be useless. Unless you can generate enough electricity to power the fans, you may have to look for smaller fans that can be used with batteries.

In many other situations, you might want to consider using gravity powered fans or others that do not require electricity. While these devices may work well enough for generating small amounts of electricity or pushing some air around a room, they are not likely to have enough power to cycle enough air in a short period of time.

That being said, you can always experiment with different fan blade designs to see if you can come up with something that spins faster while using less energy.

What About Ozone Based Air Purifiers?

Aside from trapping particles and gasses, some people claim

that ozone generators can also solve air quality problems. Sadly, there is little if any scientific evidence to back up these claims. Here are some of the main problems you may encounter when using an ozone based air purifier:

ozone can interact with other gasses in the air and form even more harmful compounds than the ones you are already dealing with. Because of all the pollution in the air these days, there is no telling what you may wind up breathing in. One thing is for certain, simply changing the composition of a gas molecule doesn't get rid of it, let alone make it safer.

Ozone cannot actually destroy mold, pollen, dust, or other particles. If you purchased an ion generator, that may cause larger particles to clump together and fall out of the air. This is still not as efficient as conventional filter media and a fan.

Aside from creating dangerous chemicals, ozone itself can cause breathing problems. In fact, if you have an air purifier with an ozone generator, it may be more than worth your while to see if you can find something that doesn't generate ozone.

Even in situations where ozone is credited with cleaning up some air problems, it takes months to years to see results. If you must get rid of radioactive dust or other hazardous materials in the air, even a few hours is a long time to sit around in a gas mask. At least conventional filter media will get the job done in a more reasonable time frame.

Natural Air Purification Methods

Did you know that some plants are capable of removing formaldehyde, methane, and other toxic fumes from the air? As an added bonus, plants are the only air filtration method available that can use the carbon dioxide removed from the air in order to produce much needed oxygen.

As a result, if you are concerned about air purification for survival shelters, plants may be a very important part of your system.

While some plants are more effective and efficient than others when it comes to filtering gasses, sufficient numbers of them can improve air quality without the need for buying and replacing more effective filters. Unfortunately, plants won't get rid of pollen, mildew, mold, and other particles that are also a part of air quality problems.

You can use plants to increase oxygen levels and decrease toxins, however a comprehensive air purifications system will still require filters and the capacity to circulate large volumes of air.

If you do enough research on air purification, you will soon find that it is similar to purifying water. There is no such thing as one filter, chemical, or device that will satisfy all of your air purifying needs. The best you can do is start off with a basic filter system and a batch of air cleaning house plants and work upward from there.

It is also very important to start off the process with a suitable set of meters and testing equipment so that you can see how much progress you are making, and how much of an impact various changes make to the air quality.



**Get Your Own Amazing Device
That Turns Air Into Water**

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