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Possible Treatments Filters

Dirt, sediment, and odors can be removed from water by using either adsorption or mechanical filters. Carbon filters are the most common adsorption filters. Fiber filters are the most common mechanical filters. Two other types of frequently used filters include oxidizing filters for removing iron and hydrogen sulfide and activated alumina filters for removing some inorganic chemicals.

Activated Carbon Filters

Activated charcoal or carbon filters are the most widely marketed home water treatment device.

How Carbon Filters Work. Activated carbon acts like a sponge to remove offensive tastes and odors, colors, chlorine, and organics. The solid material used in an activated carbon filter is typically carbon from petroleum coke, bituminous coal, lignite, wood products, or peanut shells. The partially burned material is activated by being heated and steamed without oxygen. The result is a carbon substance with many small pores. This substance is then crushed to yield a granular or powdered product.

Sometimes a synthetic resin is substituted for the carbon. Although activated carbon is efficient in removing a variety of organic chemicals, a specially formulated synthetic resin may be a better absorber for a specific contaminant.

What Carbon Filters Remove. Carbon filters are most effective in removing chlorine and potentially dangerous and carcinogenic organic compounds. These may be present in a water system as by-products of chlorination or from industrial pollution. These filters may be effective in treating turbidity, radon, and some color, taste, and odor problems. Carbon filters will absorb limited amounts of pesticides. Some carbon filters will remove lead but not as effectively as other methods.

Activated carbon filters do not correct some water problems. These filters will not remove calcium or magnesium from hard water nor will they remove dissolved metals such as iron, manganese, and copper or

chlorides, nitrates, and fluorides. They will remove only a small portion of hydrogen sulfide and are not effective against bacteria. In fact, they may promote bacterial growth especially when not used for several days or when not changed at proper intervals.

Some manufacturers claim that silver-impregnated carbon units reduce bacterial growth. However, EPA-sponsored tests of more than 30 carbon filter devices have shown that those with silver were statistically no better than those without. No known independent tests have verified the benefit of small amounts of silver in filters as a bactericide. Allowing the water to run through the filter for at least 30 seconds is a good practice to flush out bacteria that may have grown in the filter.

Factors To Consider Before Buying A Carbon Filter. Consider the following factors before buying carbon filters.

Types Of Carbon Filters. Activated carbon filters may be grouped into four general categories: pour-through, specialty, faucet-attached, and in-line.

The pour-through, similar in design to a drip coffee maker, is the simplest type of activated carbon filter. Pour-through filters are generally small and portable. Some work merely on gravity and tend to be slow whereas others contain a pump.

Specialty filters are intended to treat water for appliances such as icemakers and water coolers. Some models can even be attached to the line serving recreational vehicles.

Faucet-attached filters, as the name implies, are attached directly to the faucet where treated water is desired. The entire unit may be attached to the faucet, or the filter may be placed on the countertop and connected to the faucet with a hose.

In-line filters are the largest units and are connected directly into the house plumbing. This frequently requires the services of a plumber. The filter unit may be located under the sink, in a utility area, in the basement, or wherever it is convenient and there is sufficient space. If the unit is to be located where

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space is limited, check to make sure there is adequate room. Under-sink spaces are frequently cluttered with drain pipes, water pipes, garbage disposal, and hoses to other appliances. You need room not only to install the unit but also to service it afterwards. Spills and leaks are likely during servicing.

Maintenance. Carbon filters must be replaced regularly to avoid build up of deposits. Cartridge replacement frequency depends on the quantity of water used and the amount of carbon. If you are considering an activated carbon filter, look carefully at the cost and the ease of installing replacement filters and compare the average length of use per cartridge.

Mechanical Filters

These filters are often called particulate or turbidity filters.

How Mechanical Filters Work. Mechanical filters leave the water clearer and aesthetically more pleasing by straining it. Sand, filter paper, spun cellulose, rayon, or compressed glass wool serve as a fine sieve. Line pressure forces water through the fibers. Particles are trapped in the filter material and removed from the water. Marble chips or a slowly dissolved liming agent can neutralize acid water when it is forced through the filter.

What Mechanical Filters Remove. These devices remove dirt, sediment, and loose scale from incoming water. Mechanical filters may also be effective in removing asbestos and giardia cysts and in treating color, taste, and odor problems associated with solid organic residues. Mechanical filters can neutralize acid water when the filter contains a slowly dissolved liming agent.

Mechanical filters do not purify or soften water and have little effect on chemical contaminants dissolved in the water. They will not remove nitrates, heavy metals, pesticides, bacteria, or trihalomethane (THM) compounds.

Factors To Consider Before Buying A Mechanical Filter. Maintenance and replacement considerations are similar to carbon filters. Some fiber filters can be backwashed to remove trapped particles. Fiber filters can be used in conjunction with carbon filters.

Oxidizing Filters

These filters are often referred to as iron filters or red water filters. Oxidizing filters are most effective in water with a pH of 7 or above. If water is acidic (pH below 7), a chemical feed pump may also be needed.

How Oxidizing Filters Work. Oxidizing filters use a “greensand” resin bed to oxidize iron and manganese that are in solution. As the water flows through the

resin bed, the iron and manganese are oxidized and changed from their soluble to an insoluble form. These minerals then become trapped as rust particles within the greensand filter bed. The greensand media will also act as a filter and catch iron and manganese precipitates that have been oxidized before reaching the filter.

If iron and manganese are very high (more than 1 mg/L) or if water is acidic (pH below 7), a strong oxidizing substance must be applied prior to filtration. Super chlorination is the process most commonly used to oxidize iron and manganese and to adjust the pH. At a pH of 7 or above, iron changes more readily from its soluble to its insoluble form, which can then be removed by filtration. This process will also kill any iron bacteria, but the excess chlorine may not be filtered out.

What Oxidizing Filters Remove. Some of these units are effective for iron and manganese removal in combined concentrations up to 10 mg/L. Greensand can also be effective in removing sulfur compounds (primarily hydrogen sulfide) in concentrations up to about 5 mg/L.

Factors To Consider Before Buying An Oxidizing Filter.

Because oxidation occurs as water flows through the filter bed, much of the precipitate is filtered out near the discharge side of the greensand bed. If backwashing is not thorough, the precipitated iron and manganese can be expelled from the filter in large masses and cause a disgusting discharge from a faucet or ruin a washer load of clothes. This type of filter will not tolerate iron bacteria because the slimy material that is produced coats the greensand and fouls it.

Oxidizing filters must be regenerated with a new solution of potassium permanganate when the oxygen is depleted. The condition of the water, the size of the unit, and the amount of water consumed will all affect how quickly the oxygen is depleted.

Activated Alumina Filters

Activated alumina is a granulated form of aluminum oxide that has been heat treated to make it absorb inorganic chemicals very efficiently.

How Activated Alumina Works. In the filtration process, water containing the contaminant is passed through a cartridge or canister of activated alumina. The alumina absorbs the contaminant and fresh water continues to the service faucet.

What Activated Alumina Removes. Passing drinking water through activated alumina filtration substantially reduces arsenic, fluoride, lead, and selenium. Activated alumina devices will accumulate

bacteria, so at times treated water may have higher bacteria counts than raw water.

Factors To Consider Before Buying An Activated Alumina Filter. The cartridge of activated alumina has to be replaced periodically. It is important to determine by testing when the contaminant removal capability of the device is exhausted. Once the alumina has absorbed the maximum amount of contaminant, the filter may release contaminant to the water rather than removing it.

Filters At A Glance

How Filters Work: Absorb contaminants like a sponge or strain contaminants like a sieve.

Pros/Cons: Improve taste and odor. Remove certain organic and inorganic compounds. Can promote bacterial growth.

Maintenance: Carbon, Mechanical, Activated Alumina Filters: Replace regularly when filter is saturated.

Oxidizing Filters: Backwash to remove precipitate. Regenerate when resin is depleted.

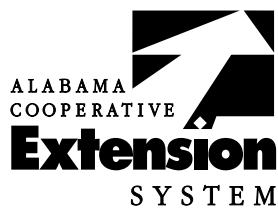
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