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Episode 42 Trolling Social Media

How do iron filtration medias differ?

- All Iron filtration medias use an oxidation reduction principle.
- Most use manganese dioxide as the catalyst to reduce the iron.
- Iron can be clear, which is ferrous, or cloudy, which is ferric.
    - Ferrous is harder to filter because it's dissolved. It can be captured with softening resin but for purposes of this podcast we're addressing different filter medias, not resin.
    - Ferric is oxidized iron.
- Most iron filtration medias have varying levels or concentrations of manganese dioxide on them.
    - Katalox Light is a zeolite material, so it filters and oxidizes. (no manganese dioxide)
    - Greensand ™, not Greensand Plus ™ is sand with glauconite (no manganese dioxide)
    - Greensand Plus is a sand substrate with a manganese dioxide coating
    - Pyrolox is pure manganese dioxide
    - Pyrolox Advantage is sand with a manganese dioxide coating.
    - Filter-Ox is a brand name for Pyrolox Advantage
    - Catalytic Carbon such as Calgon's Centaur (no manganese dioxide)
    - Cerapure-MAC (not as common as it is just being introduced into the residential market).

All the iron filtration medias as noted above need a catalyst such as oxygen, ozone, peroxide, permanganate, or chlorine.

The keys to success are:

- Have a good oxidation catalyst (the fuel) to perpetuate the action -> reaction.
    - Once oxidized, there is a catalytic reaction when the iron comes in contact with the bed.
    - It oxidizes, reduces, and filters, all in the bed, then you must backwash it.
- Have a good backwash because many of these medias are sand based and heavy.
    - If you don't have a good backwash, it will throw more iron, defeating its purpose.

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Activated Carbon – What's the difference between coal and coconut

The carbon we sell is mostly coal and coconut granular activated carbon.

- Coconut is a crop. Because it is grown there may be varying degrees of quality and pore structure in the carbon.
    - The coconut husk is the base for carbon. It's a waste product. It's burned to make char. The char is ground up, then activated in the steam kilns.
    - Coconut carbon is clean and high-quality because it's hard.
    - It has a tight pore structure.
    - It's used mostly for dechlorination because it has a tighter structure.
        - When you dechlorinate, you rob a structural molecule out of the carbon, which weakens it. Because chlorine breaks the molecular chain that holds the carbon together you slowly but surely, get black or gray water in the house.
    - We suggest coconut shell carbon for light VOC and chlorine removal.
    - For chloramine removal we use catalytic coconut carbon.

- Coal-based carbon has a larger pore structure and is slightly structurally weaker than coconut.
    - Coal is mined then evaluated to decide whether it is good for carbon production.
    - High quality manufacturers grind the coal into powder, then it's reagglomerated into the sizes we use (12x40 or 8x30 mesh). As a result there is measurable quality consistency from lot to lot.
    - Depending on the type, coal-based carbon is great for color removal, VOCs, light tannins, although we rarely use it for tannins.
    - It does an excellent job dechlorinating but can break down into powder more quickly than coconut.
- When to backwash?
    - Backwash carbon when dechlorinating. Because as previously mentioned, the reaction will breakdown the carbon. Backwashing will remove carbon fines.
    - Do not backwash when treating PFAS and volatile organics like trichloroethylene or chlorinated hydrocarbons.
        - There is a mass transfer zone, which is set up like a V inside the bed, flowing top to bottom. As the water flows through the tank the mass transfer zone is created. The mass transfer zone gradually moves down the tank until contaminant leakage occurs.
        - If backwashed, that mass transfer zone is disturbed. You will mix the good carbon into the bad carbon so there is a potential for the contaminates in the treated water.
- We don't suggest upflow carbon systems. Upflowing carbon ruins its performance because the bed can become expanded or fluid, thus creating voids for contaminants to sneak past.

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EPA PFAS PFOA Limits

Also, trending is the EPA saying there should be exceedingly small, or zero limits on the PFAS and PFOA.

- Calgon Carbon's Filtrasorb F400 and F600 work well, and they're best suited for it.
- There are ion exchange resins that work well.
    - The primary difference between ion exchange and activated carbon is reaction time.
        - Compared to carbon ion exchange empty bed contact time (EBCT) is faster. 2 to 4 minutes versus carbon at 10 minutes.
        - Carbon needs more time to work on what are called short chain PFOS. Long chains are easier to remove. Short chain contaminants such as the Gen X type PMPA or PEPA are harder to remove, so it needs more EBCT.
        - Ion exchange isn't as selective, it's just going to grab long-chain and short-chain. For flow rates over 10 gallons a minute, you should consider the ion exchange. It will have a smaller footprint.
    - We use a rule of thumb for VOC removal. A cube and a half of carbon for every gallon a minute.
        - For example, if the flow rate is 10 gallons per minute you will require 1.5 cubic feet of carbon. 10x1.5= 15 cubic feet of carbon.

We strongly suggest doing your homework or contacting experts prior to treatment application. If you want to get into this PFAS, PFOS removal, you need to consider means of disposal. Calgon is set up for carbon disposal. There is an established process with chain of custody included.

Resin is trickier. There are resin disposal companies, but we don't currently have experience with any.

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Installations

- PEX
- PRO PRESS
- COPPER

Low pH will affect copper piping by creating pin hole leaks. Install an acid neutralizer.

Beware of grounding issue:

- If PEX replaces copper and includes brass or copper elbow fittings, and there isn't an earth ground, you will have micro amp current dancing around in the plumbing, saying, "I have nowhere to go".
- This stray current will find a dissimilar metal or soft copper – soft copper is an alloy. It has tiny little impurities in it. You'll get a wormhole leak because the current/metal combo creates an anode/cathode. Wherever that impurity is, it reacts, and will buzz a little hole in the metal/copper.
- If you get these little weeper holes, you know you have a grounding problem.
- When you find that "wormy" copper, you'll need to put a big ground wire on it. A heavy wire out to an earth ground. Drive a long rod into the ground, attach the wire from the copper to the rod in a spot where you have moisture in the ground. Not under a deck or eave.

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