

Iron is one of the most difficult contaminants to remove from water. The main problem is that there are different types of iron contamination and they must be removed in different ways.

The main categories of iron are:

- **Ferrous (Fe^{2+}) / Soluble / Clear water iron:**
 - This is the most common form and the one that creates the most complaints by water users. This type of iron is identified after you've poured a glass of cold clear water. If allowed to stand for a few minutes, reddish brown particles will appear in the glass and eventually settle to the bottom.
- **Ferric (Fe^{3+}) / Insoluble / Red water iron:**
 - When this is poured into a glass, it appears rusty or has a red or yellow color. This type of iron can create serious taste and appearance problems for the water user.
- **Organic iron:**
 - Because iron combines with different naturally occurring acids, it may also exist as an organic complex. A combination of acid and iron, or organic iron, can be found in shallow wells and surface water. Although this kind of iron can be colorless, it is usually yellow or brown.
- **Iron Bacteria:**
 - Finally, when iron exists along with certain kinds of bacteria, problems can become even worse. Iron bacteria consume iron to survive and leave a reddish brown or yellow slime that can clog plumbing and cause an offensive odor. These microorganisms convert Ferrous iron to Ferric iron as part of their metabolic processes.

Actions you can take to correct an iron problem

- Once you determine whether you have "clear water", "red water", "organic" or "bacterial" iron in your water, you can take steps to correct the problem. It is important to note that there is no single treatment method for **every** type of iron problem.

Step 1: Test Your Water

- Before you attempt to remove anything that appears to be iron-related, it is important to have your water tested. A complete water test to determine the extent of your iron problem should include tests for iron concentration (both ferrous and ferric), iron bacteria, pH level and hardness.
- If you receive your water from a public water system and experience red water problems, it is important to contact a utility official to determine whether the red water is from the public system or your building's plumbing or piping.

Step 2: Select Appropriate Treatment**To remove Ferrous (soluble) iron:**

- **Option 1:** Convert to insoluble iron and then remove by filtration
- Following methods can be used to convert soluble iron to insoluble iron:
 - **Aeration:** Introducing oxygen to the water source to convert soluble iron to its insoluble form
 - **Ozonation:** A specialized form of aeration using ozone to convert soluble iron to its insoluble form
 - **Chlorination:** Chemical oxidizer used to convert soluble iron to an insoluble, filterable form.
- **Option 2:** Removal of soluble iron directly
 - **Ion Exchange:** Substituting an acceptable ion (such as sodium) for soluble iron. These require regeneration
 - **Water Softener:** Removal of soluble iron by ion exchange. These require regeneration
 - **Manganese Greensand:** An ion exchange sand material which is capable of removing iron. Adsorbs dissolved iron and requires chemical regeneration
 - **Catalytic Filtration "BIRM":** A granular filter medium that enhances the reaction between oxygen and iron and then filters the insoluble iron

To remove Ferric (insoluble) iron:

- Mechanical filtration

To Remove Iron Bacteria

- Disinfection with chlorine followed by mechanical filtration
- The water will then need to pass through a CTO filter for chlorine removal

It is important to note that the presence of Ferric (insoluble) iron will damage Reverse Osmosis membranes and the effectiveness of ion exchange media. If you have both ferrous and ferric iron present, then you need to either:

- Remove ferric iron (by mechanical filtration) before removing ferrous iron or
- Convert the ferrous iron to its insoluble (ferric) form and then remove by filtration

Important points to remember:

When you choose a water treatment method or device, make sure you have answers to the following questions:

1. What form of iron do I have in my water system?
2. Will the water treatment unit remove the total iron concentration (determined by the water test) in my water supply? (Total iron refers to both soluble and insoluble iron combined).
3. Will the treatment unit treat the water at the flow rate required for my water system?

4. Considering the results of my water test, will this method effectively remove iron? (For example, pH may need to be adjusted before beginning a particular treatment).

Effectiveness of OASIS Green Filters to reduce iron levels

- Even though particles of ferric iron are suspended in the water, there is still a big problem when trying to remove them with simple filtration. The iron particles will rapidly clog filters causing low flow rates and making frequent filter changes necessary. In order to avoid this problem it is important to use a filter with a high sediment carrying capacity. One option would be to use a two stage filtration system using **sediment** and **galaxi** filter elements – the sediment filter will remove particles of 5 microns in size or over, and the galaxi filter will remove particles of greater than 0.5 microns in size.
- As an ion-exchange media, the **Nano-CERAM** filter will effectively remove soluble Ferrous iron
- Use of a two-stage filtration system using a **galaxi** and **NanoCERAM** filter in series will effectively remove both ferrous and ferric iron. If clogging is an issue then using a three-stage system with the addition of an initial **sediment** filter may prove beneficial.