



CLASSICAL WATER FILTRATION

Classic alternatives to this modern membrane separation are gravel and multi-layer filters. Gravel or multi-layer filters are used to remove suspended solids, caused either by a previous oxidation process, through defective pipes or by flocculation or precipitation.

Gravel filter

The most commonly employed filter uses gravel, in which various types and sizes of sand and gravel are layered. If the iron content of the raw water is very high, a precipitation reactor is installed prior to the filtration. The use of a flocculating agent, in most cases poly-aluminium chloride (PAC), will agglomerate the iron so that it can easily be removed by the filter.

The use of lime is also possible, since this increases the pH value and it also serves as a seed crystal for the flocculation process. In contrast, chlorine has an inhibitory effect on the formation of flocs.

Multilayer filter

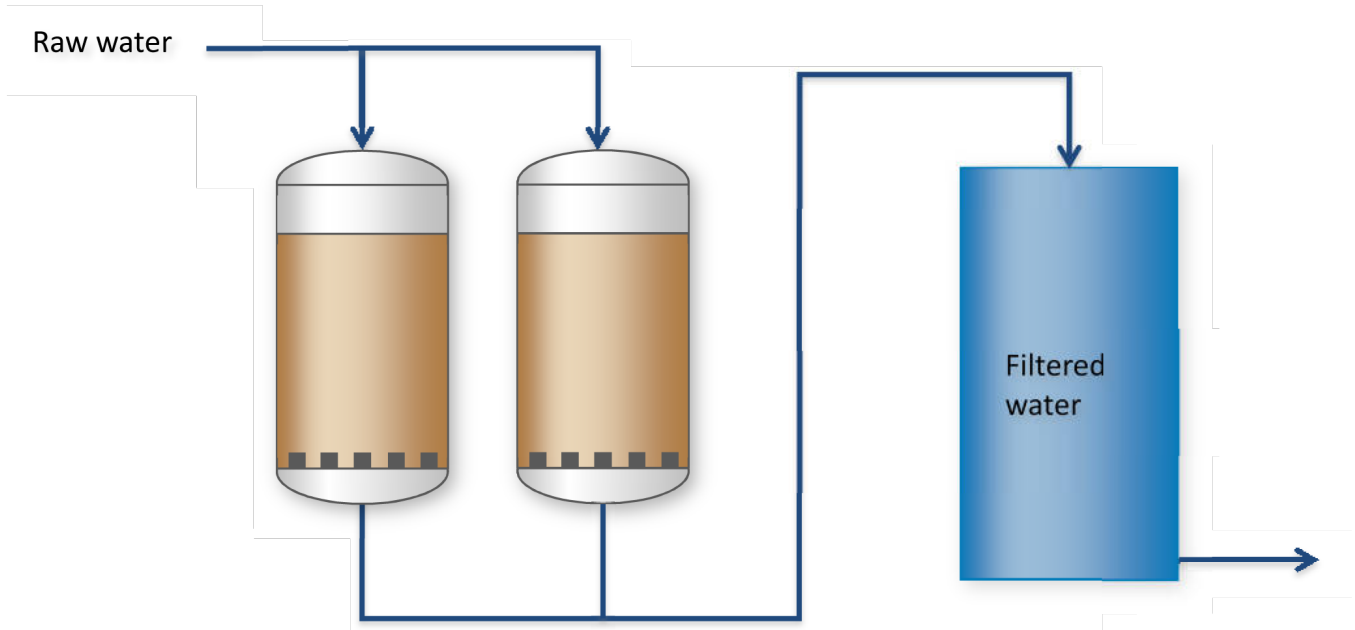
Multilayer filters consist of several types of sand, gravel and hydro-anthracite. Hydro-anthracite is a carbonaceous material that allows an in-depth filtration. The particles are filtered, not only at the surface but also in the bed itself. Accordingly, the cleaning capacity is higher and less frequent backwashing is required. These multi-layer filters also facilitate H_2S removal.

Both gravel and multilayer filters need to be back flushed with air. In the case of sand filters the backwash process takes place in combination with water, but for multi-layer filters however it needs to take place separately.

If the water contains arsenic, it can be removed with GFH-filters (Granular ferric hydroxide) containing synthetic granular ferric hydroxide. It is an adsorbent having a high porosity and a large internal surface. The material is relatively expensive and must be replaced when it is exhausted.



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Therefore, it should not be used for particle filtration, since this reduces the adsorption capacity of GFH, which leads to higher costs.

If elevated manganese levels are present in raw water, so called Greensand can be applied as filtration material which catalytically supports the oxidation of manganese and its subsequent removal through filtration. It is a naturally mined granular filtration material with a significant content of manganese oxide. This manganese oxide acts as a catalyst for the oxidation of manganese dissolved in water.

Prerequisite to complete this oxidation process is a saturation of oxygen in the water to be treated and a pH of at least 6,5.

In order not to disturb the catalytic oxidation of dissolved manganese on the Greensand surface, iron and turbidity need to be removed first as much as possible if present in water. At higher iron and turbidity levels removal of iron and turbidity maybe required in a separate filter upstream of the Greensand filter.



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