Drinking water production from surface water

On this page you will find an explanation of a drinking water preparation process. All process steps are numbered and the numbers correspond with the numbers in the schematic representation of the drinking water process found below. This is a summing up of the process steps:

a: Prefiltration

1) The uptake of water from surface waters or groundwater and storage in reservoirs. Aeration of groundwater and natural treatment of surface water usually take place in the reservoirs. Often softening and pH-adjustments already happen during these natural processes.

2) Rapid sand filtration or in some cases microfiltration in drum filters.

b: Addition of chemicals

3) pH adjustment through addition of calcium oxide and sodium hydroxide.

4) $FeCl_3$ addition to induce flocculation for the removal of humic acids and suspended particulate matter, if necessary with the addition of an extra flocculation aid. Flocs are than settled and removed through lamellae separators. After that the flocs are concentrated in sludge and pumped to the exterior for safe removal of the particulates and sludge dewatering.

5) Softening in a reservoir, through natural aeration or with sodium hydroxide, on to 8,5 ^oD. This is not always necessary. For instance, in case natural filtration will be applied, softening takes place naturally.

c: Natural filtration

6) Drinking water preparation step that is specific for the Netherlands: Infiltration of the water in sand dunes for natural purification. This is not applied on all locations The water will enter the saturated zone where the groundwater is located and it will undergo further biological purification. As soon as it is needed for drinking water preparation, it will be extracted through drains.

d: Disinfection

7) Disinfection with sodium hypochlorite or ozone. Usually ozonation would be preferred, because ozone not only kills bacteria and viruses; it also improves taste and odour properties and breaks down micro pollutants. Ozone diffuses through the water as small bubbles and enters microrganisms cells by diffusion through cell walls. It destroys microrganisms either by disturbance of growth or by disturbance of respiratory functions and energy transfers of their cells. During these processes ozone is lost according to the reaction $O_3 \rightarrow O_2 + (O)$.

e: Fine filtration

8) Slow sand (media) filtration for the removal of the residual turbidity and harmful bacteria. Sand filters are backwashed with water and air every day.

9) Active carbon filtration for further removal of matter affecting taste and odour and remaining micro pollutants. This takes place when water streams through a granular activated carbon layer in a filter. Backwash is required regularly due to silting up and reactivation of an active carbon filter should be done once a year.

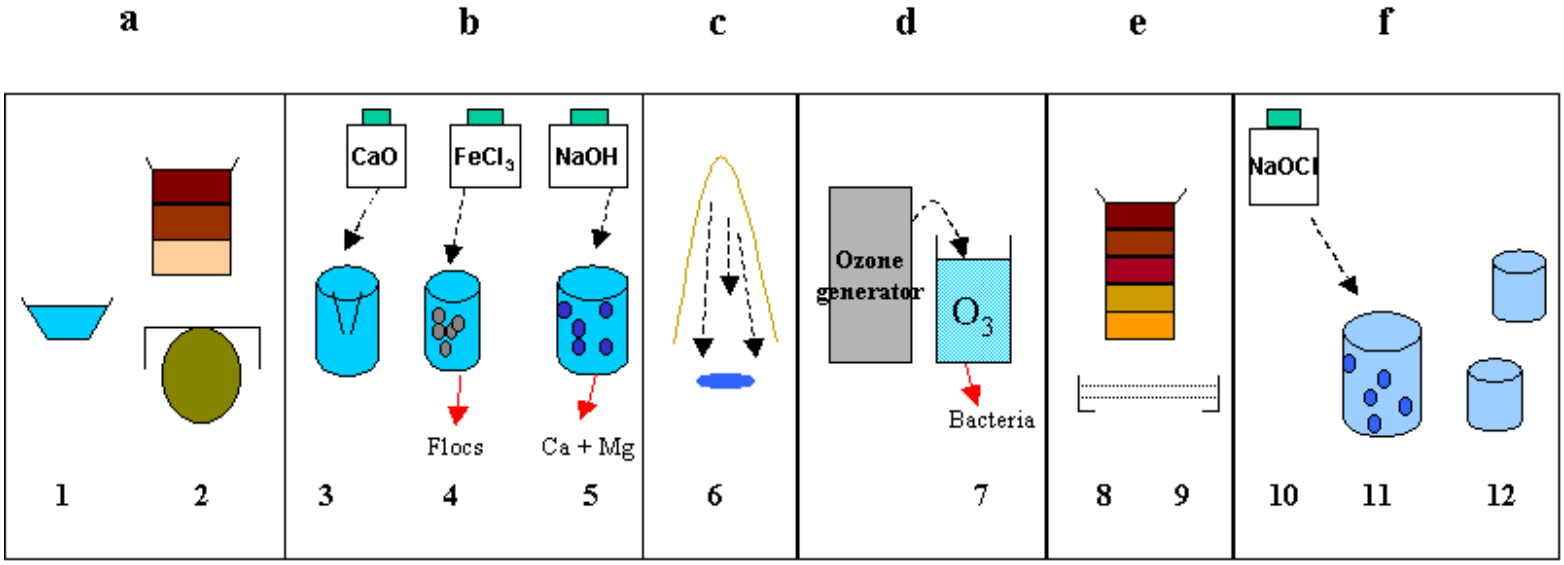
f: Preservation and storage

10) Addition of 0.3 mg/L sodium hypochlorite to guarantee the preservation of the obtained quality. Not all companies chlorinate drinking water. The water will eventually be distributed to users through pipelines and distribution pumps.

11) Aeration for recovery oxygen supply of the water prior to storage. This is not always applied.

12) Remaining water can be stored in drinking water reservoirs.

In the following schematic representation of the drinking water preparation process dotted arrows represent the incoming chemicals and red arrows represent the outgoing flows.



Schematic representation of the drinking water preparation process

Water is not always infiltrated in sand dunes during treatment. Holland clearly illustrates this:
- In Rotterdam water is stored in reservoirs in the Biesbosch, where it undergoes natural treatment
- In Amsterdam the water was stored and naturally treated in sand dunes on to the year 2000, now it is stored in reservoirs
- In The Hague the water is still stored and naturally treated in sand dunes

For the answer to your questions on drinking water, check out our drinking water FAQ

[Home] [Back] [More Info]

Rotterdamseweg 402 M
2629 HH Delft, The Netherlands
tel: (+31)(0)15 26.10.900
fax: (+31)(0)15 26.16.289
e-mail: Feedback