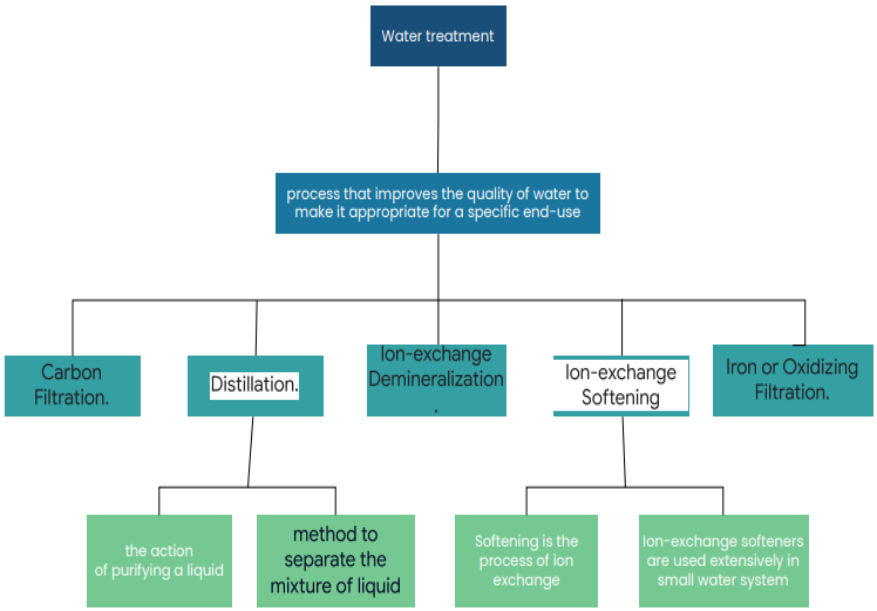
WATER TREATMENT

NAME : GNANA VASANTH.P.H

REG NO : AU962921104008

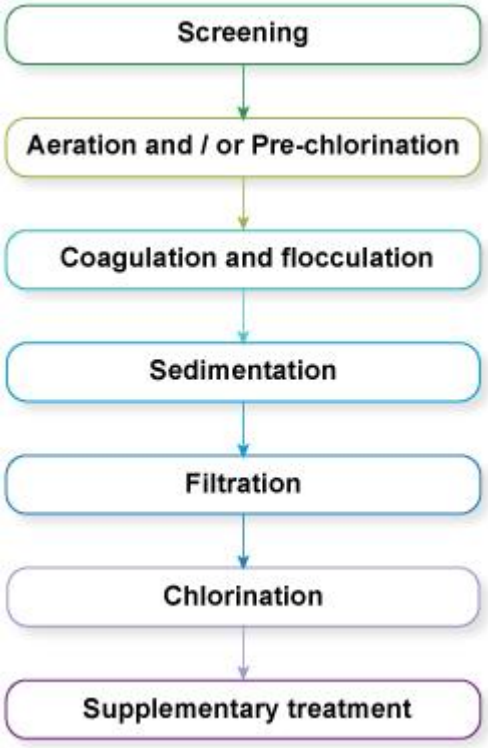
INNOVATION:



Water treatment is any process that improves the quality of water to make it appropriate for a specific end-use. The end use may be drinking, industrial water supply, irrigation, river flow maintenance, water recreation or many other uses, including being safely returned to the environment.

Water treatment is the process of removing all those substances, whether biological, chemical, or physical, that are potentially harmful to the water supply for human and domestic use. This treatment helps

to produce water that is safe, palatable, clear, colorless, and odorless. Water also needs to be non-corrosive, meaning it will not cause damage to pipework.



There are seven major steps involved in the large-scale water treatment for urban municipal water supply. Each of the steps are described in the article below:

1. Screening

To protect the main units of a treatment plant and aid in their efficient operation, it is necessary to use screens to remove any large floating and suspended solids present in the inflow. These materials include leaves, twigs, paper, rags, and other debris that could obstruct flow through the plant or damage equipment.

2. Aeration

After screening, the water is aerated (supplied with air) by passing it over a series of steps to take in oxygen from the air. This process helps in expelling soluble gases such as carbon dioxide and hydrogen sulfide (both of which are acidic, so this process makes the water less corrosive) and expels any gaseous organic compounds an undesirable taste to the water. Aeration also removes iron or manganese by oxidation of these substances to their insoluble form. Iron and manganese can cause peculiar tastes and can stain clothing. Once in their insoluble forms, these substances can be removed by filtration.

3. Coagulation and Flocculation

After aeration, coagulation occurs to remove the fine particles (less than 1 µm in size) suspended in the water. In this process, a chemical called a coagulant (with a positive electrical charge) is added to the water, which neutralizes the fine particles' negative electrical charge. The coagulant's addition takes place in a rapid mix tank where a high-speed impeller rapidly disperses the coagulant.

4. Sedimentation

Once large flocs are formed, they need to be settled out, and this takes place in a process called sedimentation (when the particles fall to the floor of a settling tank). The water (after coagulation and flocculation) is kept in the tank for several hours for sedimentation to take place. The material accumulated at the bottom of the tank is called sludge; this is removed for disposal.

5. Filtration

Filtration is the process where solids are separated from a liquid. In water treatment, the solids that are not separated in the sedimentation tank are removed by passing the water through sand

and gravel beds. With a flow rate of 4–8 cubic meters per square meter of filter surface per hour, rapid gravity filters are often used.

6. Chlorination

After sedimentation, the water is disinfected to eliminate any remaining pathogenic micro-organisms. The most commonly used disinfectant (the chemical used for disinfection) is chlorine, a liquid (such as sodium hypochlorite, NaOCl), or a gas. It is relatively cheap and simple to use. When chlorine is added to water, it reacts with any pollutants present, including micro-organisms, over a given period of time, referred to as the contact time. The amount of chlorine left after this is called residual chlorine. This stays in the water through the distribution system, protecting it from any micro-organisms that might enter it until the water reaches the consumers.

7. Supplementary Treatment

Supplementary treatment may be needed for the benefit of the population. One such instance is the fluoridation of water, where fluoride is added to water. It has been stated by the World Health Organization that ‘fluoridation of water supplies, where possible, is the most effective public health measure for the prevention of dental decay. The optimum fluoride level is around 1 mg per liter of water (1 mg l^{-1}).