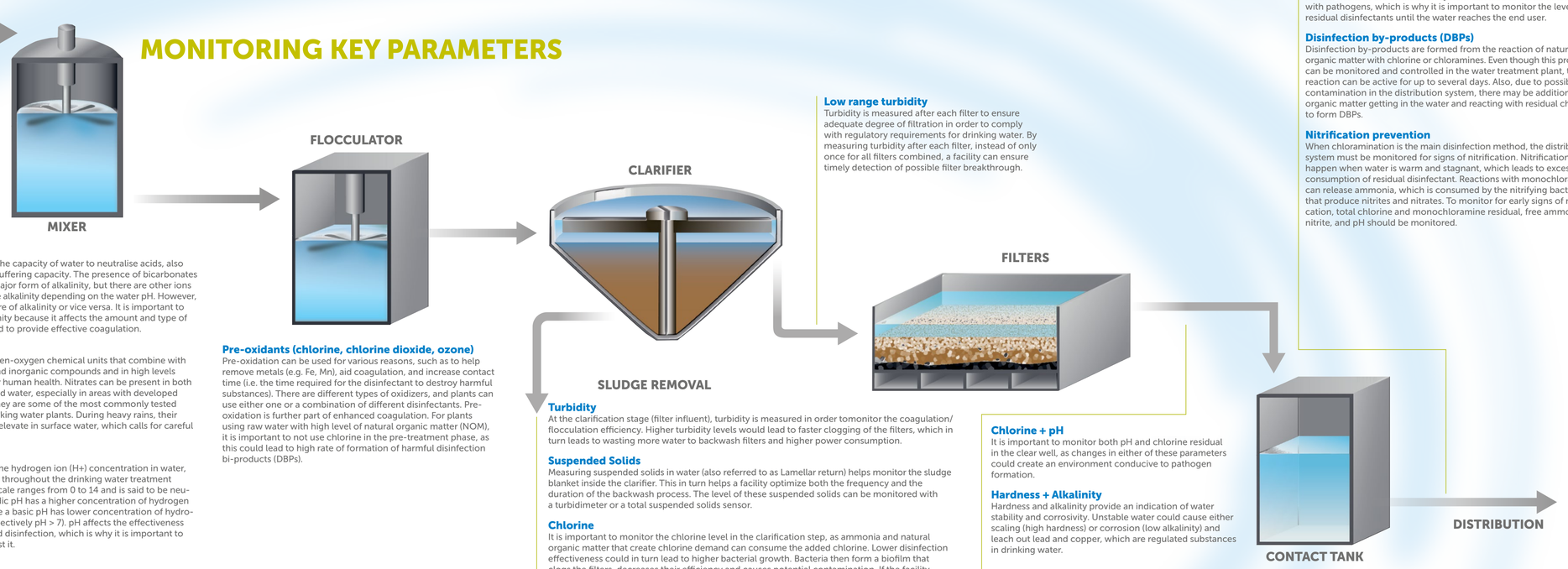
STAY IN CONTROL OF YOUR DRINKING WATER TREATMENT PROCESS

Save time and money. Deliver high quality water.

MONITORING KEY PARAMETERS



Turbidity
Turbidity is an optical property of solutions resulting from light interaction with suspended solids such as silt, clay, algae, organic matter or microorganisms. These particles scatter and absorb light that passes through water, and measuring the light reflected at a 90 degree angle is the method for quantifying turbidity. Turbidity does not specify any particular compound, it simply tells the effects that the suspended particles create. Measuring turbidity allows for early detection of changes in the incoming water quality.

Natural Organic Matter (NOM)
Natural Organic Matter (also known as Dissolved Organic Carbon – DOC) represents any organic material that exists in the natural water source (primarily surface water), and one of the main goals of the drinking water treatment process is to remove these dissolved organics. This is especially important when chlorine is used as a disinfectant, as NOM's reaction with chlorine leads to the formation of carcinogenic disinfection by-products (i.e. THMs).

Total Organic Carbon (TOC)
Total Organic Carbon is comprised of a variety of organic compounds in various oxidation states. Most TOC in surface source waters is fulvic andhumic acid originating from decaying plant materials. Levels can fluctuate depending on seasonal conditions, weather events and watershed topography. TOC removal is important for control of disinfection by-product control.

Ammonia
When chlorine is used in the pre-oxidation (primary disinfection) step, and there is naturally occurring ammonia in the source water, this ammonia provides chlorine demand that consumes the disinfectant. The reaction of ammonia with chlorine leads to the formation of chloramines, which are weaker disinfectants than free chlorine.

Metals (Iron, Manganese)
Ground water can often have higher than acceptable levels of metals, such as iron and manganese. These metals produce mainly aesthetic problems (brownish colour of the water, black deposits in showers, sinks) as well as taste and odour issues and therefore need to be monitored and removed.

Hardness
Water hardness is a measure of the concentration of dissolved calcium and magnesium salts. It can be one of two types: carbonate or temporary-containing bicarbonates of calcium and magnesium, or non-carbonate or permanent-containing other calcium and magnesium salts, e.g. sulfates, nitrates, and chlorides.

Alkalinity
Alkalinity defines the capacity of water to neutralise acids, also referred to as its buffering capacity. The presence of bicarbonates determines one major form of alkalinity, but there are other ions contributing to the alkalinity depending on the water pH. However, pH is not a measure of alkalinity or vice versa. It is important to know water alkalinity because it affects the amount and type of chemicals required to provide effective coagulation.

Nitrates
Nitrates are nitrogen-oxygen chemical units that combine with various organic and inorganic compounds and in high levels can be harmful for human health. Nitrates can be present in both surface and ground water, especially in areas with developed agriculture, and they are some of the most commonly tested parameters in drinking water plants. During heavy rains, their levels can further elevate in surface water, which calls for careful monitoring.

pH
pH is an index of the hydrogen ion (H+) concentration in water, and it is measured throughout the drinking water treatment process. The pH scale ranges from 0 to 14 and is said to be neutral at pH of 7. Acidic pH has a higher concentration of hydrogen ions (pH < 7), while a basic pH has lower concentration of hydrogen ions (and respectively pH > 7). pH affects the effectiveness of coagulation and disinfection, which is why it is important to measure and adjust it.

Conductivity
Conductivity of water is defined as its ability to conduct or support electric current. Electric current is supported by the ions present in water, and therefore conductivity is a measure of total dissolved solids (TDS). Changes in the water conductivity at the influent can indicate changes in the composition of the source water.

Pre-oxidants (chlorine, chlorine dioxide, ozone)
Pre-oxidation can be used for various reasons, such as to help remove metals (e.g. Fe, Mn), aid coagulation, and increase contact time (i.e. the time required for the disinfectant to destroy harmful substances). There are different types of oxidizers, and plants can use either one or a combination of different disinfectants. Pre-oxidation is further part of enhanced coagulation. For plants using raw water with high level of natural organic matter (NOM), it is important to not use chlorine in the pre-treatment phase, as this could lead to high rate of formation of harmful disinfection bi-products (DBPs).

Low range turbidity
Turbidity is measured after each filter to ensure adequate degree of filtration in order to comply with regulatory requirements for drinking water. By measuring turbidity after each filter, instead of only once for all filters combined, a facility can ensure timely detection of possible filter breakthrough.

Turbidity
At the clarification stage (filter influent), turbidity is measured in order tomonitor the coagulation/flocculation efficiency. Higher turbidity levels would lead to faster clogging of the filters, which in turn leads to wasting more water to backwash filters and higher power consumption.

Suspended Solids
Measuring suspended solids in water (also referred to as Lamellar return) helps monitor the sludge blanket inside the clarifier. This in turn helps a facility optimize both the frequency and the duration of the backwash process. The level of these suspended solids can be monitored with a turbidimeter or a total suspended solids sensor.

Chlorine
It is important to monitor the chlorine level in the clarification step, as ammonia and natural organic matter that create chlorine demand can consume the added chlorine. Lower disinfection effectiveness could in turn lead to higher bacterial growth. Bacteria then form a biofilm that clogs the filters, decreases their efficiency and causes potential contamination. If the facility chloraminates, it is important to measure monochloramine in filter influent for better process control. If there is another pre-oxidant (e.g. ClO_2) used for primary disinfection, it may be necessary to measure its residual to prevent the formation of DBP.

pH
pH is monitored and adjusted to assure adequate disinfection.

Metals
Metal salts are often used as coagulants to help remove suspended particles from the water. However, if the coagulant dose is excessive, it may produce higher metal concentrations that need to be monitored and controlled to comply with regulatory requirements.

Chlorine + pH
It is important to monitor both pH and chlorine residual in the clear well, as changes in either of these parameters could create an environment conducive to pathogen formation.

Hardness + Alkalinity
Hardness and alkalinity provide an indication of water stability and corrosivity. Unstable water could cause either scaling (high hardness) or corrosion (low alkalinity) and leach out lead and copper, which are regulated substances in drinking water.

Oxidants (disinfectants)
Any reducing agent in the distribution network will create chlorine demand and therefore lower the disinfecting capacity of water. Further, leaks in the distribution system can lead to contamination with pathogens, which is why it is important to monitor the level of residual disinfectants until the water reaches the end user.

Disinfection by-products (DBPs)
Disinfection by-products are formed from the reaction of natural organic matter with chlorine or chloramines. Even though this process can be monitored and controlled in the water treatment plant, this reaction can be active for up to several days. Also, due to possible contamination in the distribution system, there may be additional organic matter getting in the water and reacting with residual chlorine to form DBPs.

Nitrification prevention
When chloramination is the main disinfection method, the distribution system must be monitored for signs of nitrification. Nitrification may happen when water is warm and stagnant, which leads to excessive consumption of residual disinfectant. Reactions with monochloramine can release ammonia, which is consumed by the nitrifying bacteria that produce nitrites and nitrates. To monitor for early signs of nitrification, total chlorine and monochloramine residual, free ammonia, nitrite, and pH should be monitored.

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