

# Strategies for wastewater treatment processes



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Some wastewater treatment process in other hand classified into three categories which followed the nature of the treatment process that used nowadays, they are physical, chemical and biological treatment processes. Most of the full wastewater treatments systems are included several processes from these three categories.

Physical methods wastewater treatment is the process that totally rely on physical phenomena only in progress of improving and treating the wastewater. In this method, there are no any gross chemical or biological changes needed to carry out. Some examples like sedimentation or called clarification, screening, aeration, filtration, flotation and skimming, degasification, equalization are classified as the physical method for wastewater treatment. Take sedimentation process for further explanations, it is a process where the solids is settle by gravity in order to carry out the process. This process is carry out by collecting the wastewater in a short period of time, the collected wastewater was stored in a tank that is under quiescent conditions, which then slowly let the heavier solids to settle and those "clarified" effluent is also remove at the same time. Sedimentation process is very common process used for solid separation nowadays, and it is already set up to be used in the beginning and end of the full wastewater treatment operation which is what we have now. Sedimentation is already a physical treatment that cannot be excluded in order to successfully carry out the wastewater treatment.

Another common process that also under the physical treatment category is the aeration, which is a process by just physically add some air into wastewater, gas that often used is oxygen. The process is to allow the

oxygen exchange at the surface, eventually lead to the release of noxious gasses such as carbon dioxide, methane and hydrogen sulfide gas from the water. Filtration is also another common physical phenomena treatment, this treatment require a filter medium to separate the solids from the wastewater, filter medium like sand filters can continue removed the entrained from the wastewater used. Some physical phenomena will take part in sedimentation process; this will affect the water quality in the good way. Substance like greases or oils can be applying the flotation technique, skimming, or physically removing in order to separate from the wastewater.

For some industrial management wastewater treatment, they will create strong and undesirable waste in just a little time needed. These wastes have the ability in destroy biological treatment process. So the wastes were kept to remained in the wastewater system, or has mixed with other waste, and eventually release to the environment, which will cause eliminating “shocks” to the treatment plant. Such process called equalization. There is another type of equalization, which is when the wet well of a pump station will collect many types of wastewater and then follow with the step that pump those wastes onward at constant rates.

Second category is the chemical treatment process, physical treatments rely on physical phenomena, and so chemical treatment is depending on certain chemical reaction in order to improve the water quality. The examples of chemical wastewater treatment are chlorination, ozonation, neutralization, coagulation, adsorption, and ion exchange. Among all these chemical treatment, the most famous and common one is the chlorination.

Chlorination process is the using of chlorine to kill bacteria and also to slow

down the rate of the wastewater to decompose. Chlorine is being chosen because of its strong oxidizing properties. Bacteria can be successfully eliminated from the wastewater when there is a vital biological process occurred which is caused by the chlorine added. There is an alternative way to replace the chlorination, which is by using the ozone to undergo ozonation. Ozone is also a common strong oxidizing agent that is chosen to carry out oxidizing disinfection other than chlorine.

Besides using chemicals to undergo oxidation, industrial wastewater treatment commonly applies neutralization. Water is commonly known that it is at a pH value of 7, the neutral state. So if the water is too acidic, there will be a need to add a selective base to adjust back the neutrality of the wastewater. In other words, the same goes to if the water is too basic, an acid is needed to add to the wastewater to adjust back the pH value. This technique is called neutralization. Another common chemical wastewater treatment is coagulation. This process is about to add some chemicals into the wastewater, which will cause some reaction to be occurred. The chemical added will react with the substance inside the wastewater and then form an insoluble end product, thus these end products can be easily removed in order to produce clean water. The examples of chemicals that are used for the coagulation process are polyvalent metals, limestone, iron-binding compounds like  $\text{FeSO}_4$  and  $\text{FeCl}_2$  or  $\text{FeCl}_3$ , and last is the alum,  $\text{Al}_2(\text{SO}_4)_3$ .

Some chemical treatment actually is the combination of chemical and physical processes. The nature of the process is come from both chemical and physical. One of the examples is the using the activated carbon to extract

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or remove the organic substance in the wastewater. For ion exchange process, this process is least applied in the wastewater treatment nowadays. The ion exchange process is actually added some chemical in order to exchange certain ion in the wastewater only, this process is not help a lot in the field of wastewater treatment and the process is slow.

The last category that needs to discuss is the biological wastewater treatment. Biological process in wastewater treatment is related to apply biology field substance, such as microorganisms in order to produce the clean water. There are many microorganisms but the most used in biochemical decomposition of wastewater is the bacteria, the purpose of the bacteria is to stabilize the end products. If there are still many other microorganisms are present, or even the sludge, they will be converted to carbon dioxide gas, water and some side product by the treatment method. The major groups of biological wastewater treatment have two main events, one is aerobic method and the other is the anaerobic method, the different between these two processes is the present of dissolved oxygen. Under aerobic method there have several examples, such as: activated sludge treatment methods, trickling filtration, oxidation ponds, lagoons, and aerobic digestion, whereas for the example of anaerobic method are: anaerobic digestion, septic tanks, and lagoons.

The main purpose of a wastewater treatment is to remove those solid substances in the water, in order to have a good condition and clean water to be used in our daily life. Most solid is the primarily organic substance, at this instant there will eventually have some inorganic solid being filter out also along with the organic substances. The treatment also need a enhance

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function to help remove the sludge in the water also. Before the treatment process come to the end, some addition work need to carry out to control the odors of the water, one more is retard the biological activity in order to destroy those pathogenic organisms that still remained in the wastewater.

The actual full wastewater treatment as mention before, it will have the combination of physical, chemical and biological methods, so the devices need to be used will also widely cover these three fields, where the degree of a treatment mainly named using the terms primary, secondary and tertiary treatment.