

Waste Water Treatment Basic Concepts

Wastewater treatment is closely related to the standards or expectations set for the effluent quality. Wastewater treatment processes are designed to achieve improvements in the quality of the treated wastewater. Wastewater treatment has three major steps: primary, secondary, and tertiary. Primary treatment involve mechanical process of cleaning, Secondary treatment involves biological process to clean the distributed solids. Tertiary treatment can remove more than 99 percent of all the impurities from sewage, producing an effluent of almost drinking-water quality

The use of conventional water and wastewater treatment processes becomes increasingly challenged with the identification of more and more contaminants, rapid growth of population and industrial activities, and diminishing availability of water resources. Three emerging treatment technologies, including membrane filtration, advanced oxidation processes (AOPs), and UV irradiation, hold great promise to provide alternatives for better protection of public health and the environment.

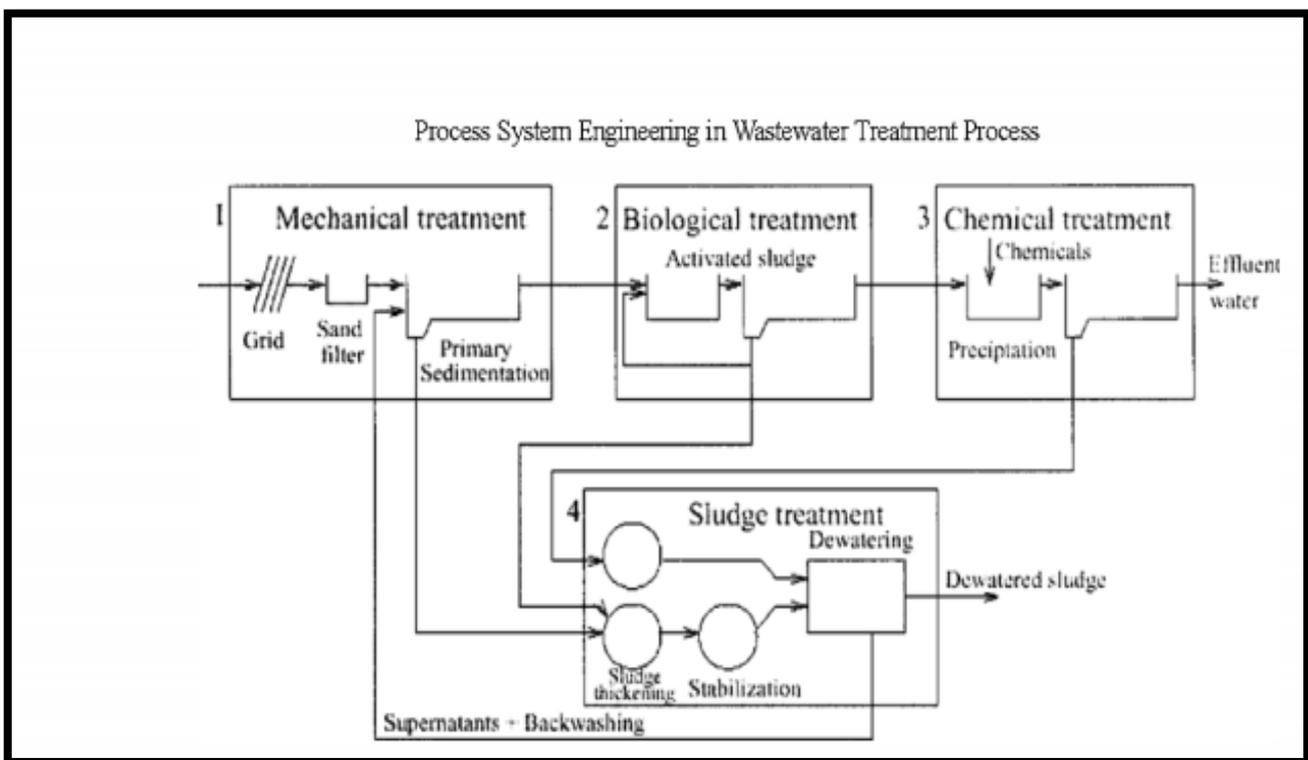


Fig: Common Layout of Waste water Treatment

The principal objective of wastewater treatment is generally to allow human and industrial effluents to be disposed of without danger to human health or unacceptable damage to the natural environment. Irrigation with wastewater is both disposal and utilization and indeed is an effective form of wastewater disposal (as in slow-rate land treatment).

However, some degree of treatment must normally be provided to raw municipal wastewater before it can be used for agricultural or landscape irrigation or for aquaculture. The quality of treated effluent used in agriculture has a great influence on the operation and performance of the wastewater-soil-plant or aquaculture system. In the case of irrigation, the required quality of effluent will depend on the crop or crops to be irrigated, the soil conditions and the system of effluent distribution adopted. Through crop restriction and selection of irrigation systems which minimize health risk, the degree of pre-application wastewater treatment can be reduced. A similar approach is not feasible in aquaculture systems and more reliance will have to be placed on control through wastewater treatment.

There are many ways of combining the operations and processes in an ETP

- A properly designed biological treatment plant, which typically includes screening, equalization, pH control, aeration, and settling, can efficiently satisfy BOD, pH, TSS, oil and grease requirements. However the compounds in industrial effluent may be toxic to the microorganisms so pre-treatment may be necessary. Most dyes are complex chemicals and are difficult for microbes to degrade so there is usually very little colour removal.
- Another option is a physico-chemical treatment plant, which typically includes screening, equalization, pH control, chemical storage tanks, mixing unit, flocculation unit, settling unit and sludge dewatering. This type of treatment will remove much of the colour depending on the processes used. It can be difficult to reduce BOD and COD to meet effluent standards and it is not possible to remove TDS.
- Most often, physico-chemical treatment will be combined with biological treatment. The typical components of such a plant are screening, equalization, and pH control, chemical storage, mixing, flocculation, primary settling, aeration, and secondary settling. The physico-chemical treatment always

comes before the biological treatment units. Using a combination of treatments will generally reduce pollutant levels to below the discharge standards.

- Another form of biological treatment is the reed bed, which can be used with a settling tank, or in combination with other treatment processes. It presents a natural method of treating effluent which is often lower in capital, operation and maintenance costs. Reed beds can contribute to a reduction in colour, a decrease in COD, an increase dissolved oxygen and a reduction in heavy metals, but function best with some form of pre-treatment.
- In Sewage Treatment generally Combination of Primary and Secondary Treatment is used to achieve out norms as per CPHEEO manual for Sewage water treatment. Different Technologies are used like ASP, MBBR SBR etc in secondary process

As discussed, there are many options for the design of an ETP & STP. The type of plant and the various components of the plant will depend on the characteristics of the effluent. In evaluating an ETP design in an application for an ECC, it is necessary to determine whether the components of the ETP are sized correctly for the flow and to assess whether the effluent is likely to meet the requirements of the discharge standards.

Sources:

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