# Frequently asked questions

1. **Explain the characteristics of waste water.**

   Wastewater has characteristic changes in several of its parameters such as pH (organic or inorganic acids), obstructing components (glass shards, plastic parts, sand, etc.,), solids such as total solids, suspended solids (0.45 µm), filterable solids and settleable solids, varied organic substances contributing to increased BOD and COD, nutrient salts (Nitrogen, Phosphorus, Sulfur, responsible for eutrophication) and even hazardous substances [Absorbable organic halogen compounds, chlorinated hydrocarbons and halogenated hydrocarbons, hydrocarbons (benzene, phenol, and other derivatives), heavy metals, in particular mercury, cadmium, chromium, copper, nickel, and zinc].

2. **What are the principles of waste water treatment**

   The basic purposes of liquid waste treatment are:

   - To destroy pathogenic microorganisms
   - To remove most suspended solids
   - To remove dissolved biodegradable organic materials
   - To remove hazardous chemicals to regenerate water for reuse.

3. **What are the parameters need to be considered to determine appropriate waste water treatment methods?**

   There are several parameters which are considered to decide the appropriate methods for waste water treatment. The following factors are considered to major

   - Production methods
   - Water supply and water processing
   - Technical condition and age of the production site
   - Training and motivation of employees
   - Use of certain additives and cleaning agents, etc.
   - Number of shifts, seasonal differences (campaign operation)
   - Effluent requirements (direct or indirect discharge)
   - Extent of production-integrated environmental protection means
   - Number of wastewater treatment facilities

4. **Explain waste water generated from different food industry with examples**

Waste water generated from different food industry varies in its composition and hence it is important to assess waste characteristics to develop proper treatment methods. In general waste water possess several group of contaminants and in particular waste water generated from meat and poultry industry is characterized with organic load (up to 8000 mg/L BOD), high in oils and grease, salt, nitrogen and phosphorus with SS at 800 mg/L or greater. It may also have a high temperature. The water may also contain pathogens like *Salmonella* and *Shigella*, parasite eggs and amoebic cysts. Pesticides may also present, depending on the treatment of animals and their feed. Chloride levels may be very high from curing and pickling processes (77,000 mg/L). Besides that, fat and grease content is significantly increased by cooking activities in the plant.

In fish and shellfish processing industry waste water has high organic concentration such as oils, proteins and SS. Phosphates, nitrates and chloride may be an issue as well. The properties of wastewater depend on the kind of fish being processed, with marked differences between white and fatty fish (e.g. because white fish are eviscerated at sea). Therefore, there is a wide variation in emission levels, e.g. COD may range from 2000 mg/L for white fish to 60,000 mg/L for oily fish species.

Even fruit and vegetables processing industry generates in large quantities of waste water mainly by cleaning, but there may be other sources of pollution depending on the process. Typically, wastewater is high in SS, sugars and starches, often with additional pollutants like brines or acids. The requirements for aggressive chemicals are, however, low in comparison with other sectors, unless fats and oils are involved in the processing. In some cases, residual pesticides may appear in the wastewater stream, depending on the country of origin of the produce.

5. **Discuss different waste water treatment methods employed.**

The waste water treatment methods are grouped into three general categories such as

- Primary treatment: Screening, grit removal, and sedimentation (settling)
- Secondary or biological treatment: biological processes and additional settling.
- Tertiary or advanced treatment: Microfiltration, ultra filtration, reverse osmosis etc.,

A typical treatment sequence in a wastewater treatment plant consists of the stages listed below. Most industrial factories, however, have only a few of these operation stages,

either because they do not have to cope with the respective pollutants in their wastewater or because they are exempted from particular treatment steps due to specific regulations, which occurs, e.g., with indirect dischargers.

1. Removal of obstructing substances (screens, grit chamber)
2. Solids removal (strainers, settling tank, flotation)
3. Storing equalization cooling
4. Neutralization or adjustment of the pH
5. Special treatment (detoxification, precipitation/flocculation, emulsion cracking, ion exchange)
6. Biological treatment or concentration increase (evaporation) or separation (membrane methods)