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Waste water management techniques: Food processing

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Introduction

Whenever the food ingredients undergo any type of processing whether it is small or large it always brings about waste water having suspended solids which may cause environmental or economic consequences. Contamination levels of waste water is generally measured regarding biochemical oxygen demand and chemical oxygen demand. There is always specific cost for treating the wastewater depending on its characteristics. The two main potential characteristics which read out cost are volume of waste water and its relative strength. Specific limits are identified for some hazardous chemical compounds (Phosphorus, nitrogen, etc.) of waste water while discharging into stream, river or lake.

Waste from food processing operations

Waste water pollutants varies depending up on variety of ingredients used and process carried out in it. Peeling and dicing increases dissolved solids, Fruit processing releases sugars, cereal and brewing create carbohydrate rich effluent, pulses protein, oilseeds fats, meat and poultry releases protein and fat; and root vegetables gives rise to total suspended solid levels in effluent. When the particles are greater than 1mm size should be removed by using screens and strainers before fitting effluent into drains, screens and strainers must be cleaned every day.

Waste water treatment

Physical treatment

Depending on the effluent type sedimentation and flotation form the starting stage of effluent treatment. Flotation techniques, it is simple when it done in a long tank. Water flows at ≥ 0.3m/s, fine gas bubbles are introduced in to tank at its base by oxygen injection or by electrolysis. Bubbles with 0.2–2.0 mm in diameter rise at 0.02 – 0.2 m/s in water by the

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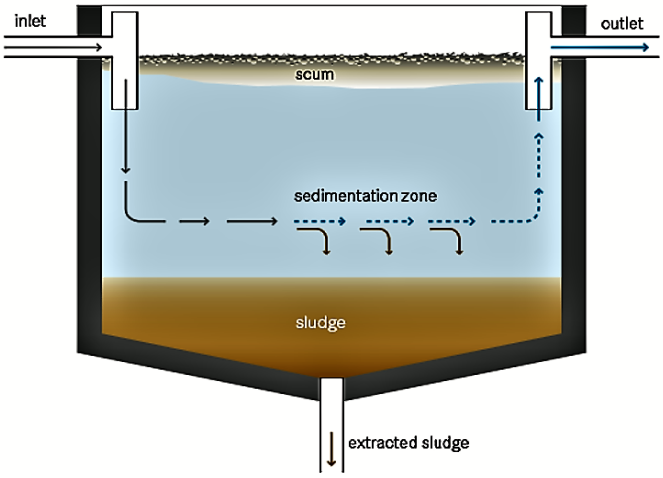
association of fat globules with the gas bubbles forming less dense larger particles which rise rapidly to the surface. Excess foaming is prevented by free fat by acting as antifoaming agent. This is sold off soap or fatty acid production after scrapping off and dewatering.

Sedimentation technique is used to remove total suspended solids in which waste water pumped through rectangular tank with ≥ 0.3m/s to allow grit and mineral particles to sediment without loss of suspended organic material, this grit may be removed by jog conveyor. After these two treatments waste eater sent to the balance tanks to equalize the fluctuations in pH, temperature and concentrations.

Chemical treatment

The organic compounds persist either in solution or in colloidal dispersion in water. Addition of polyvalent cations for example ferric chloride or aluminium sulphate make waste water neutral thus the colloidal particles have negative charge. This stimulate formation of denser agglomerates that can be sedimented and recovered as sludge. Usually, sludge from settlement vessels contains about 4% solids, this is sent to the additional settlement tank where the half of the supernatant is removed and retreated.



Biological treatment

Biological treatments can be aerobic and anaerobic processes. Oxygen acts as the acceptor in aerobic process so the primary products are carbon dioxide and water. Aerobic treatments create fewer polluting effluents. In anaerobic treatment, primary products are methane

and carbon dioxide, with sulphur being reduced to hydrogen sulphide. It has great potential in large-scale treatment of sludge and highly polluted waste waters. Generally, smaller plants opt for aerobic treatment while the larger plants opt for combination of aerobic and anaerobic methods.

Comparison of aerobic and anaerobic processes

S.No.	Factor	Aerobic	Anaerobic
1	Capital cost	Lower	Higher
2	Energy cost	Medium-high	Net output
3	Influent quality	Flexible	Demanding
4	Sludge retention	High Low	Low
5	Effluent quality	Potentially good	Poor

Conclusion

Waste minimization must start from the delivery of raw material to industry to deliver of end product to the customer. It is always essential that any food processing industry should be designed and managed so as to minimize both the amount of fresh water used and the quantity of waste produced. Waste water should be treated with appropriate treatments and leave to river or lake by following safeguarding levels of compounds or particles in it otherwise it can have serious ecological ramifications.