

Food processing industries

Those industries whose main concern is the production of edible goods for human or animal consumption.

These include 1) Dairies 2) canneries 3) Breweries and distilleries 4) sugar (cane or beet) 5) meat packing 6) pharmaceutical 7) yeast plants 8) miscellaneous: Plants such as pickles, coffee, soft drinks, rice, etc.

The production process usually consists of steps.

- Cleaning of raw material
- Removal of inedible portions.
- Preparation of foodstuffs
- Packaging

Food processing industries

The wastewater originates from or contains

- Spoiled raw material/spoiled product
- Washing water
- Cooling water
- Transporting water process waters
- Floor and equipment cleaning water
- Product drainage
- Overflow from tanks or vats
- Unusable portions of product

Variation in characteristics such as BOD (100 to 1lakhs) SS (0 to 1 lakh), pH (3.5 to 11), nutrients N& P, (0 to excess) volume (min to > 1000 m³/day).

Food processing industries

Common characteristics:

- Usually contain organic matter in dissolved or colloidal form.
- Hence, characterized as biodegradable wastewater
- Usually high BOD than sewage, hence pretreatment is required before discharge into sewers.
- The adjustments required are, pH correction, nutrient addition, mixing, temperature control, flow variation.

Food processing industries

Type of treatment depends on

- Degree of treatment required
- Nature of the organic waste
- Concentration of organic matter
- Variation in waste flow a volume of waste
- Capital and operating costs and land available

Wastewater Discharge standards for food and fruit processing industry

Category	Concentration not to be exceed				Quantum
	pH	Suspended Solids (mg/L)	Oil & Grease (mg/L)	BOD at 27 °C, 3 days, mg/L	gm/ tonne of product
A. Soft Drinks					
Fruit based synthetic (> 0.4 tonne/day) Bottles and tetrapack	6.5 – 8.5	100	10	30	--
Synthetic (< 0.4 tonne/day)	Disposal via Septic tank				

Wastewater Discharge standards for food and fruit processing industry

Category	Concentration not to be exceed				Quantum
	pH	Suspended Solids (mg/L)	Oil & Grease (mg/L)	BOD at 27 °C, 3 days, mg/L	gm/ tonne of product
B. Fruits & Vegetables					
a) Above 0.4 tonne/day	6.5 – 8.5	50	10	30	--
b) 0.1 to 0.4 tonne/day	6.5 – 8.5	--	--	300	--

Wastewater Discharge standards for food and fruit processing industry

Category	Concentration not to be exceed			
	pH	Suspended Solids (mg/L)	Oil & Grease (mg/L)	BOD at 27 °C, 3 days, mg/L
C. Bakery				
Bread and Biscuit				
a) Continuous process >20 tonne/day	6.5 – 8.5	--	--	200
b) Non-continuous process < 20 tonne/day	Disposal via septic tank			
Biscuit Production > 10 tonne/day	6.5 -8.5	--	--	300
Biscuit Production < 10 tonne/day	Disposal via septic tank			

Cannery Wastes

- Three main groups of products – vegetable, fruits, citrus fruits (lemon)
- Organic wastes results from trimming, juicing, blanching, pasteurizing of raw materials, cleaning equipments.
- **Blanching** – to put into boiling water for few seconds to loosen skin or to kill enzymes.
- **Pasteurization:** aims to achieve a logarithmic reduction in the number of microorganisms, so that they are unlikely to cause diseases.
- The effective way of waste management is discharge in to sewers, lagooning with chemical addition, soil application and anaerobic digestion.
- Many canneries process **more than one product**, due to seasonal nature of product.

Origin of cannery waste

- **Vegetable Canning:**

- Peas, tomatoes, beets, carrots, corn, beans, are the vegetables which produce strong waste during canning.
- Processing differs for individual vegetable.
- In vegetable canning the **wastewater usually consists of** wash water, solids from sorting, peeling, spillage, wash water from floor cleaning, tables, belts, etc.

Origin of cannery waste

- **Fruit Canning:**

- In fruit canning, cherries, apples, pears, grapes are common.
- Wastewater originates from peeling, spray washing, sorting, grading, slicing and canning, cooling of cans, and plant cleanup.

- **Citrus fruits canning:**

- Oranges, lemons, grape fruits.
- Wastewater originates from cooling waters, pulp-press liquors, processing plant waste, floor washing mixed with peel, rag and seed of the fruits and surplus juice from washing operations.

Characteristics of cannery wastes

- Volume and characteristics vary considerably from plant to plant.

Product	BOD mg/l	SS mg/l
Tomatoes	600-1800	550-900
Corn	880-3000	530-2300
Apples	1600-3400	300
Citrus wastes	2100-3000	1700-3400
Peas	400-4700	270-400

Wastewater characteristics and Impact on receiving stream

Treatment of cannery waste

- **Seasonal business**, hence, treatment should be suitable for that volume and characteristics for short duration production period.
- When **product changes** the treatment plant should have capacity to handle changed waste, characteristics and volume.
- Effectively treated by screening, chemical precipitation, lagooning and spray irrigation.
- Anaerobic digestion is also used but to lesser extent.

Treatment of cannery waste

- Screening – 12 to 30 mm opening for large solids removal. Screening material can be discharged to landfill, dried and burned or used as animal feed.
- Chemical precipitation (pH adjustment) is used to reduce solids loading. (Ferric salt or alum)
 - Sludge can be dried on sand beds.
- Lagooning – effective when land is available
 - offers biological treatment, both aerobic and anaerobic
 - along with sedimentation, soil absorption, evaporation, and dilution.
- UASB reactor is also reported to be successful.

Treatment of cannery waste

