

Presentation
on
Waste Water Treatment Process

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WASTE WATER TREATMENT PROCESS

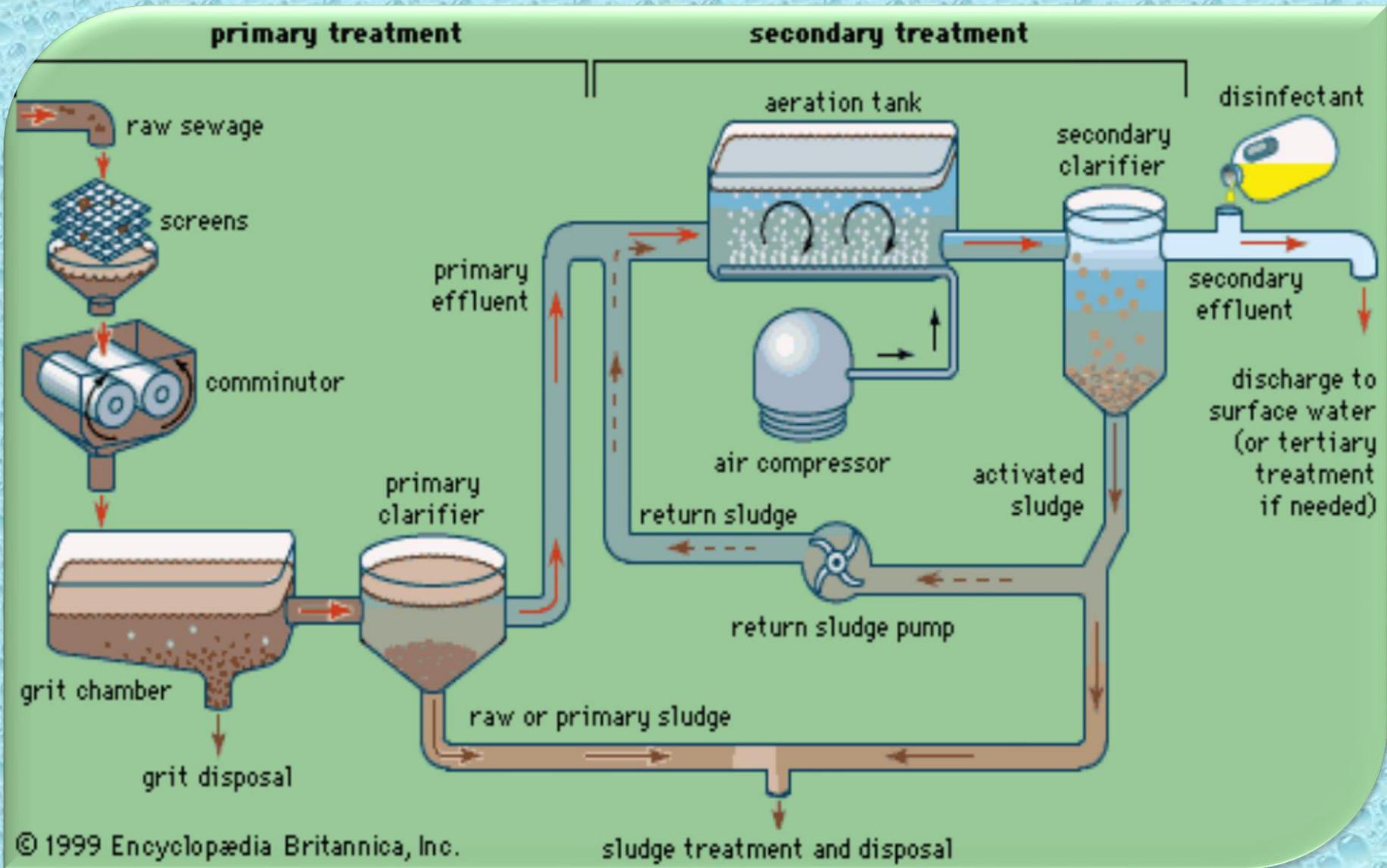
Preliminary Treatment

Primary Treatment

Secondary Treatment

Tertiary Treatment

Waste Water Treatment Process



Preliminary Treatment

Removal of waste water constituents such as rags, sticks, floatable grit, and grease that may cause maintenance or operational problem with the treatment operations, processes, and ancillary systems

Preliminary Treatment

Preliminary treatment consists of following units

- Screening For removal of floating matter.
- Grit Chamber For removal of sand and grits.
- Comminuters For grinding large size suspended solids
- Floatation Units For removal of oil and grease
- Skimming Tanks
- Flow Measuring units such as partial flume
- Pumps
- Pre-aeration Units

Primary Treatment

Removal of a portion of the suspended solids and organic matter from the wastewater.

Advanced Primary Treatment

Enhanced removal of suspended solids and organic matter from the wastewater. Typically accomplished by chemical addition or filtration known as Coagulation and Flocculation.

Primary Treatment

Primary treatment consists of following processes/units

- Sedimentation Primary Settling Tanks
- Coagulation Secondary Settling Tank
- Flocculation

Secondary Treatment

Removal of biodegradable organic matter [insoluble or suspension state] and suspended solids. Disinfection is also typically included in the definition of conventional secondary treatment

Secondary Treatment with Nutrient Removal

Removal of biodegradable organics, suspended solids, and nutrients (nitrogen phosphorus, or both nitrogen and phosphorus)

Secondary Treatment

Secondary Treatment Process for Wastewater Applications:

- Aeration Systems
- Biological Treatment Systems
- Sludge and Bio solids Processing Systems

Secondary treatment consists of following processes.

- Activated Sludge Process
- Oxidation Ponds and lagoons
- Trickling Filter

Tertiary Treatment

Removal of residual suspended solids (after secondary treatment), usually by granular medium filtration or micro screens. Disinfection is also typically a part of tertiary treatment. Nutrient removal is often included in this definition

Tertiary Treatment

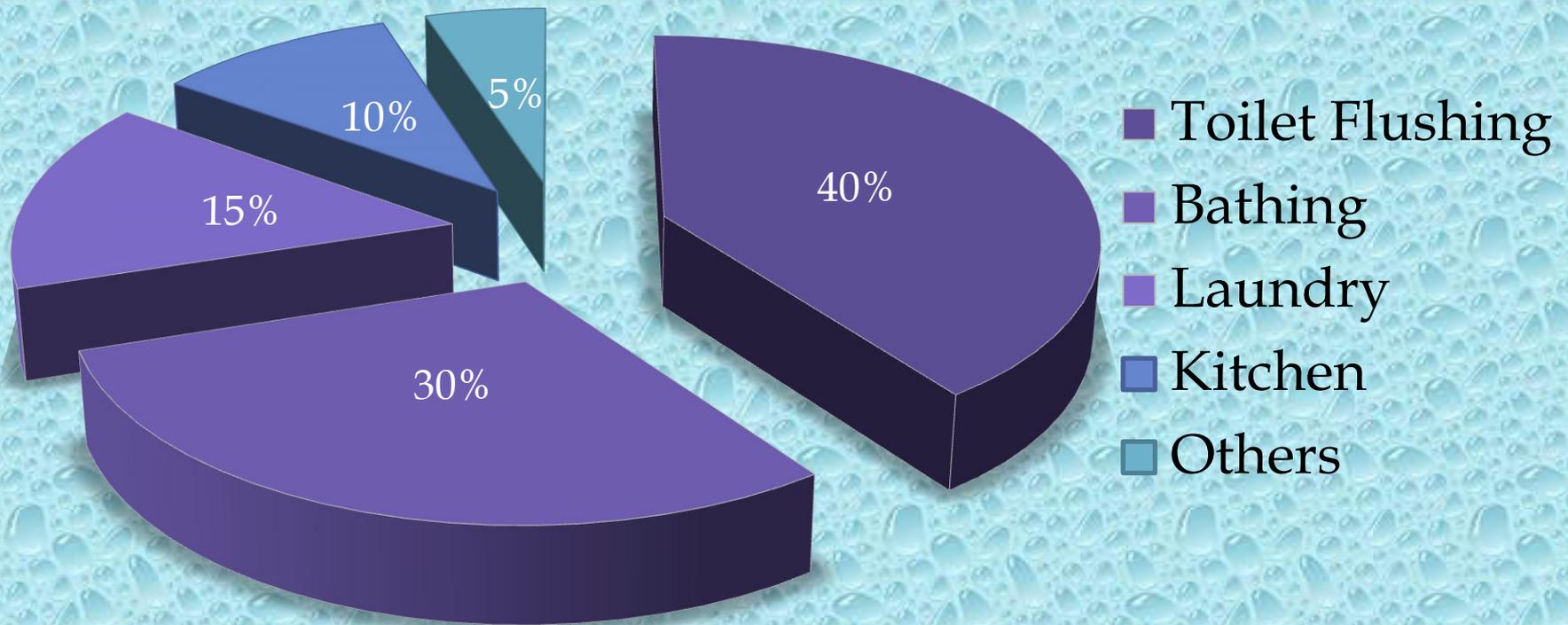
Tertiary treatment consists of following processes and units.

- Membrane Filtration and Separation
- Dechlorination and Disinfection Systems
- Reverse Osmosis (RO) Systems
- Ion Exchange
- Activated Carbon Adsorption
- Physical/Chemical Treatment

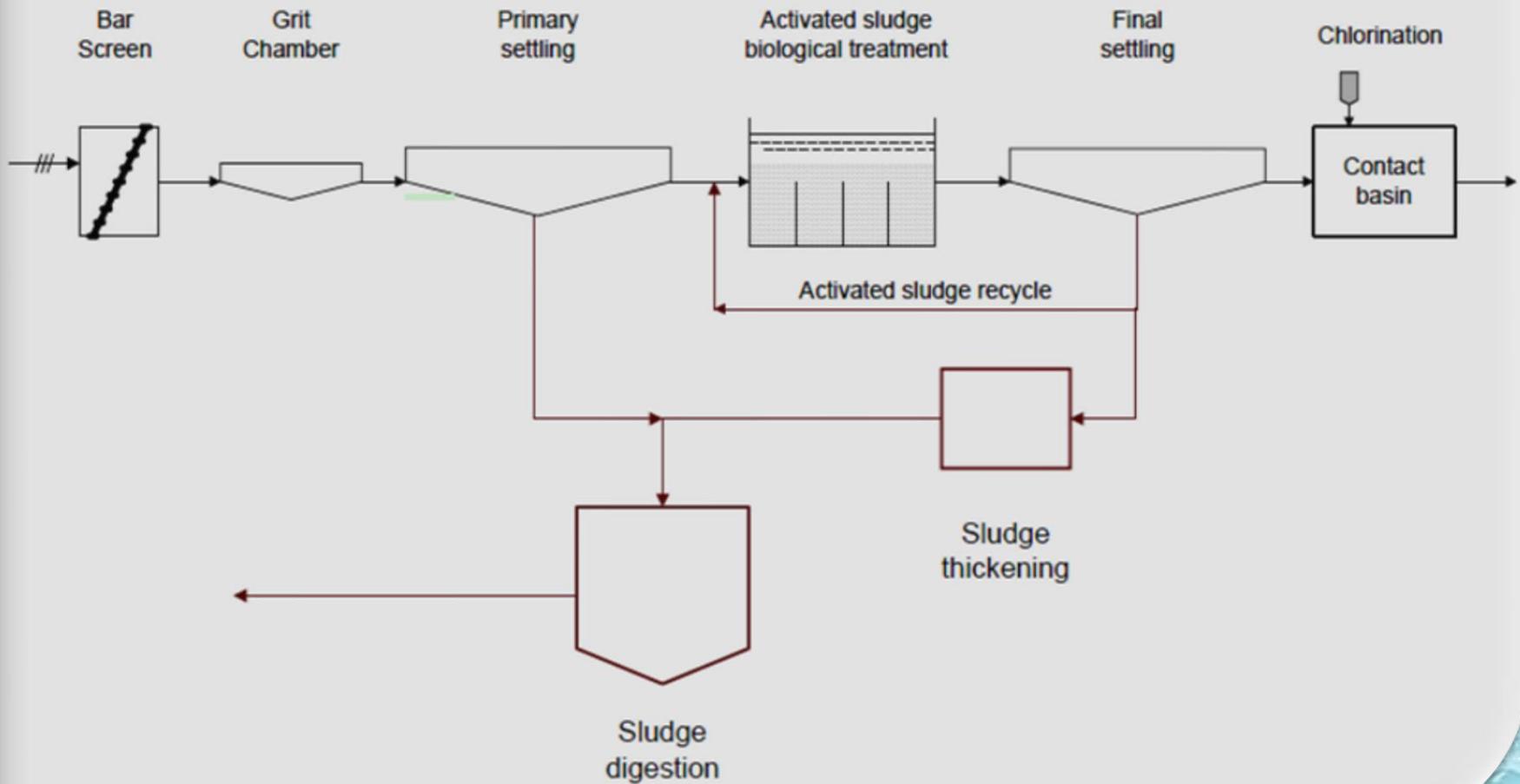
Functions of Water Treatment Units

Unit Treatment	Function (Removal)
Screening	Floating matter
Sedimentation	Suspended matter
Coagulation	Suspended matter, a part of colloidal matter and bacteria
Chemical methods	Iron, Manganese, etc.
Filtration	Remaining colloidal dissolved matter, bacteria
Disinfection	Pathogenic bacteria, Organic matter and Reducing substances
Softening	Hardness
Aeration, chemicals use	Colour, Odour, Taste

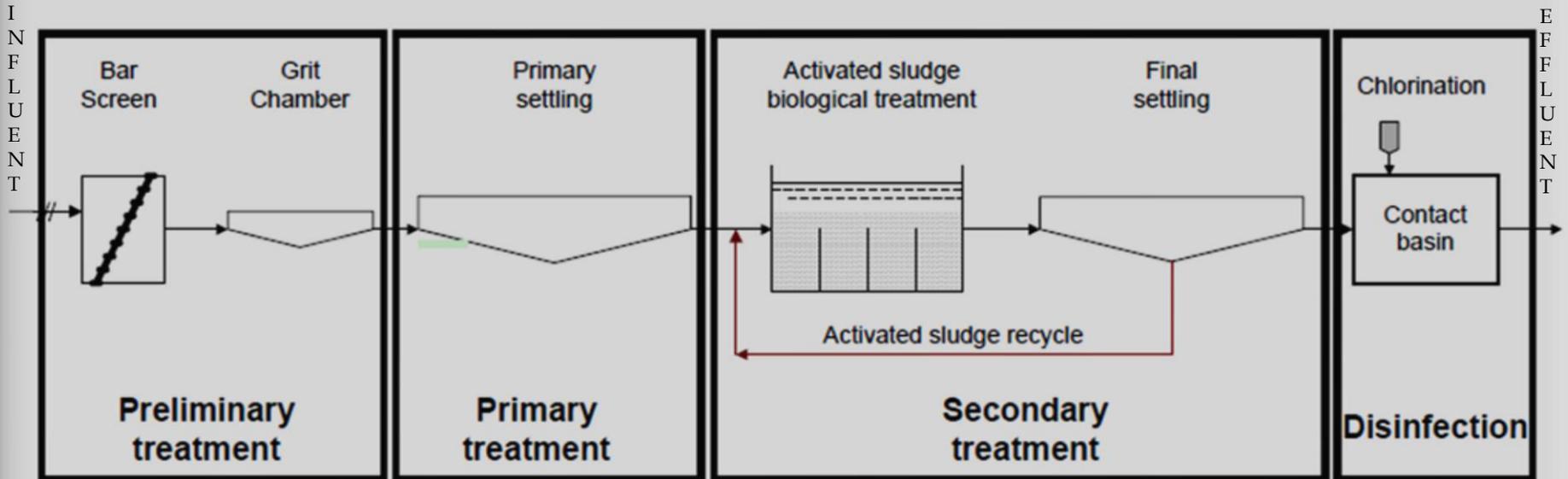
Source of Domestic Wastewater



Typical wastewater treatment plant



Typical wastewater treatment plant



Can also have tertiary treatment to remove nutrients and other pollutants

Plan of a Typical Waste Water Treatment Plant



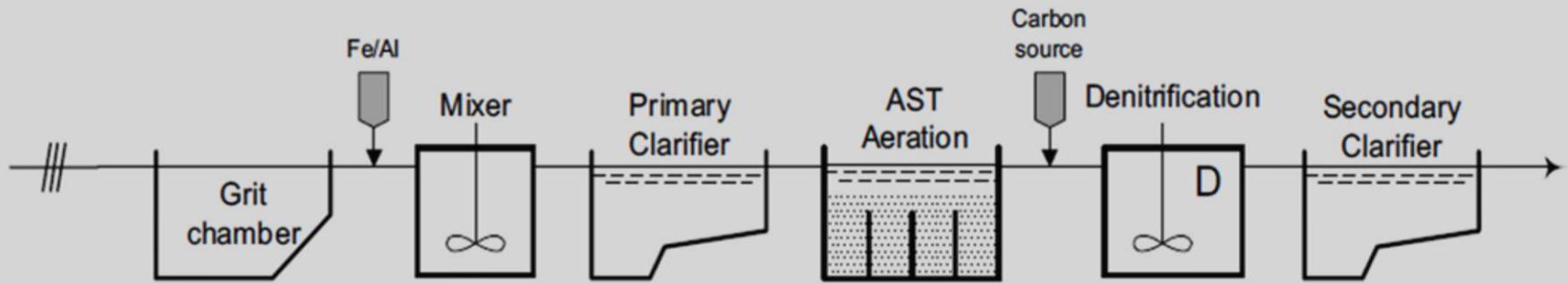
Primary Treatment Process

Sedimentation is primary treatment Process.

Sedimentation is a physical water treatment process used to settle out suspended solids in water under the influence of gravity.

Removal Efficiency of Primary Treatment Process :

- Removal efficiency of Biological Oxygen Demand (B. O.D.) in primary treatment process is 30%
- Removal efficiency of Total Suspended Solids (T.S.S.) in primary treatment process is 60%



**Typical Primary Treatment Plant
with preliminary treatment process**

Sedimentation Tank



Secondary Treatment Process

Stabilization ponds & Lagoons:

- The *stabilization ponds* are open flow through basins specifically designed and constructed to treat sewage and biodegradable industrial wastes.
- They provide long detention periods extending from a few to several days.
- Pond systems, in which oxygen is provided through mechanical aeration rather than algal photosynthesis are called *aerated lagoons*.
- Lightly loaded ponds used as tertiary step in waste treatment for polishing of secondary effluents and removal of bacteria are called *maturation ponds*.

Activate Sludge Process

In activated sludge process wastewater containing organic matter is aerated in an aeration basin in which micro-organisms metabolize the suspended and soluble organic matter.

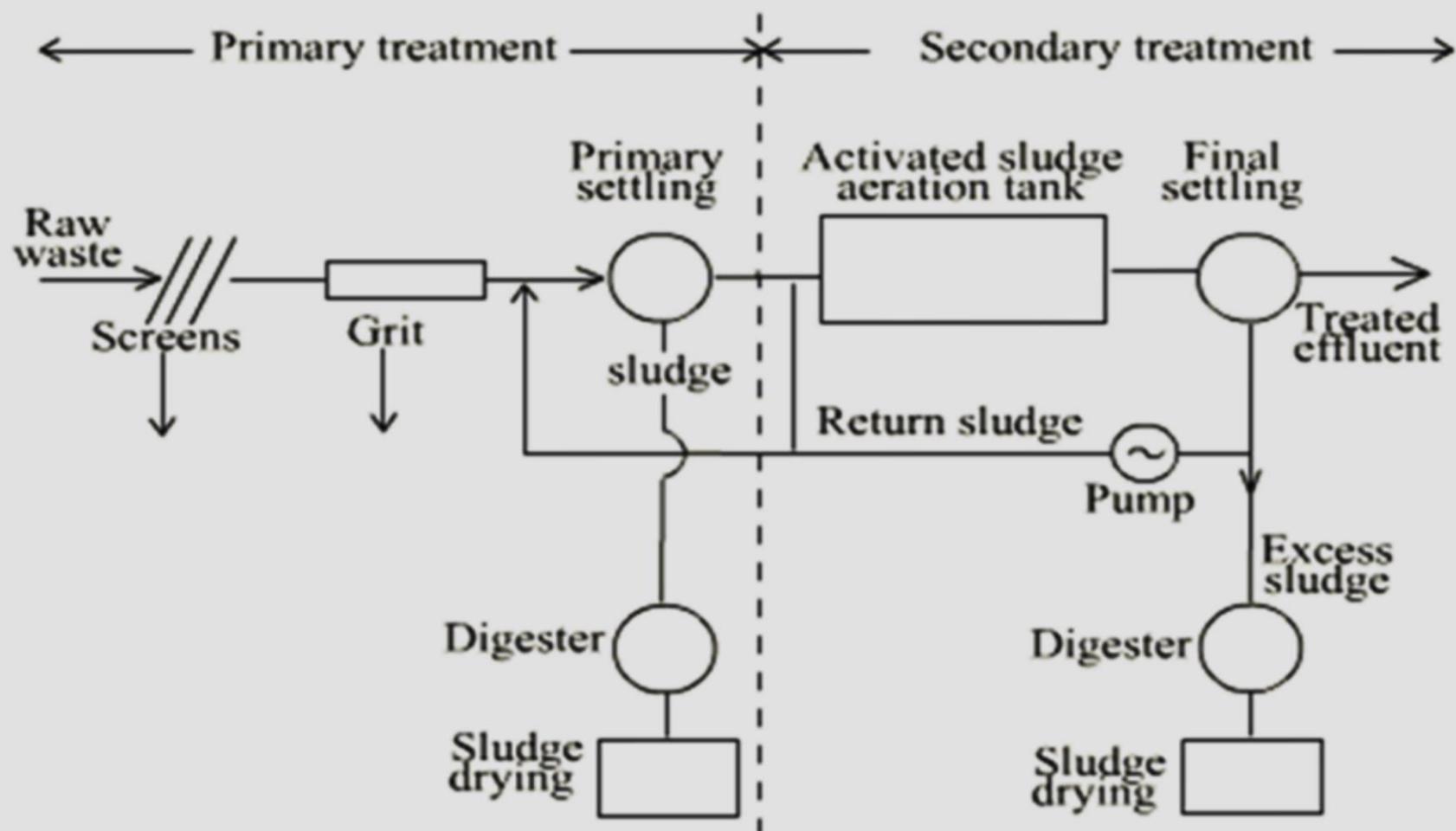
Activated sludge plant involves:

- wastewater aeration in the presence of a microbial suspension
- solid-liquid separation following aeration
- discharge of clarified effluent
- wasting of excess biomass, and
- return of remaining biomass to the aeration tank.

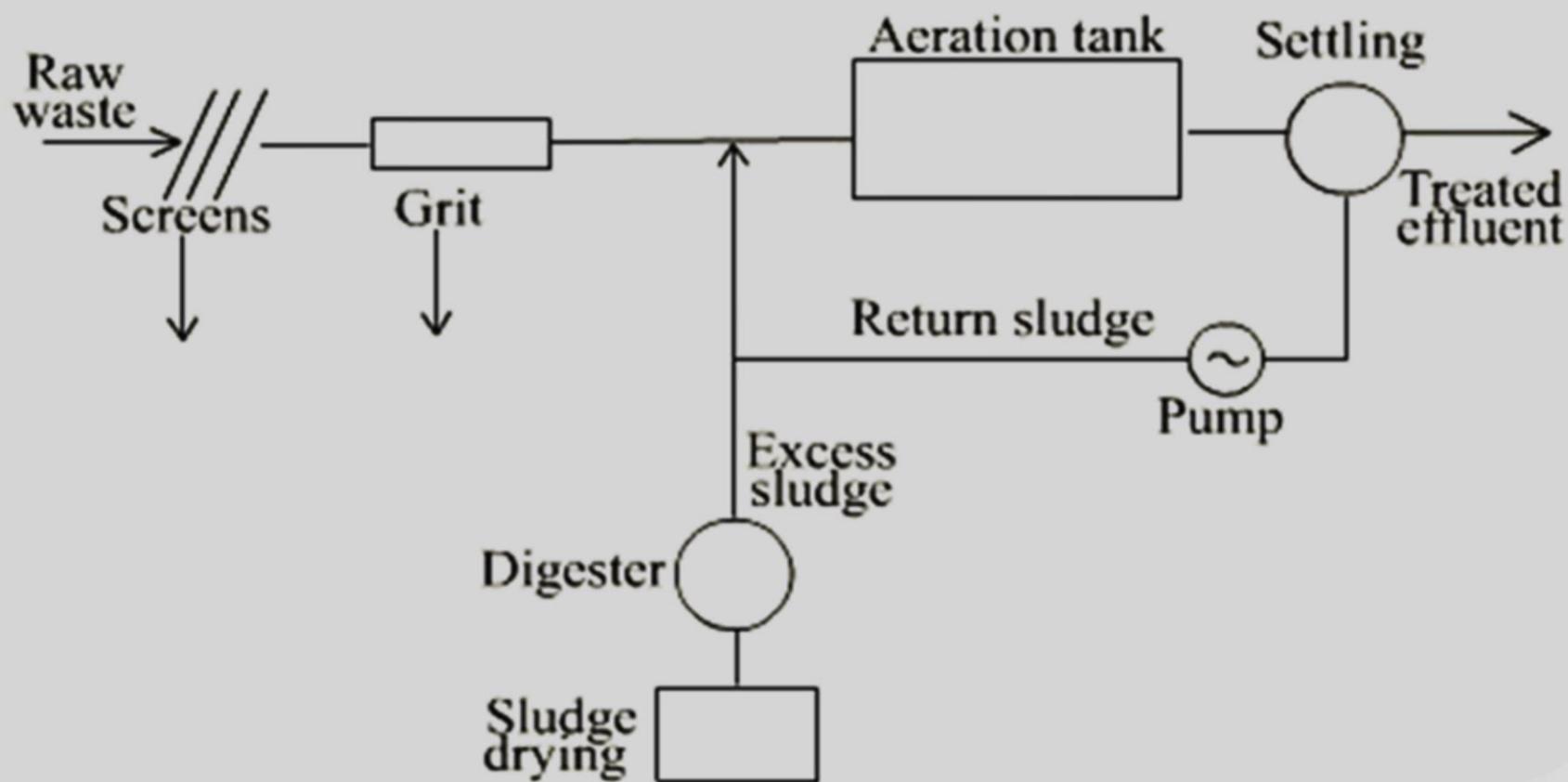
Removal Efficiency of Activated Sludge Process :

Metal	Removal Efficiency
Al	<20%
Mo	<20%
As	<20%
Pb	20-50%
Mn	20-50%
Ag	20-50%
Cd	>50%
Fe	>50%
Cr	>50%

Flow sheet of an activated sludge system



Flow sheet of an extended aeration system



Classification of Stabilization Ponds

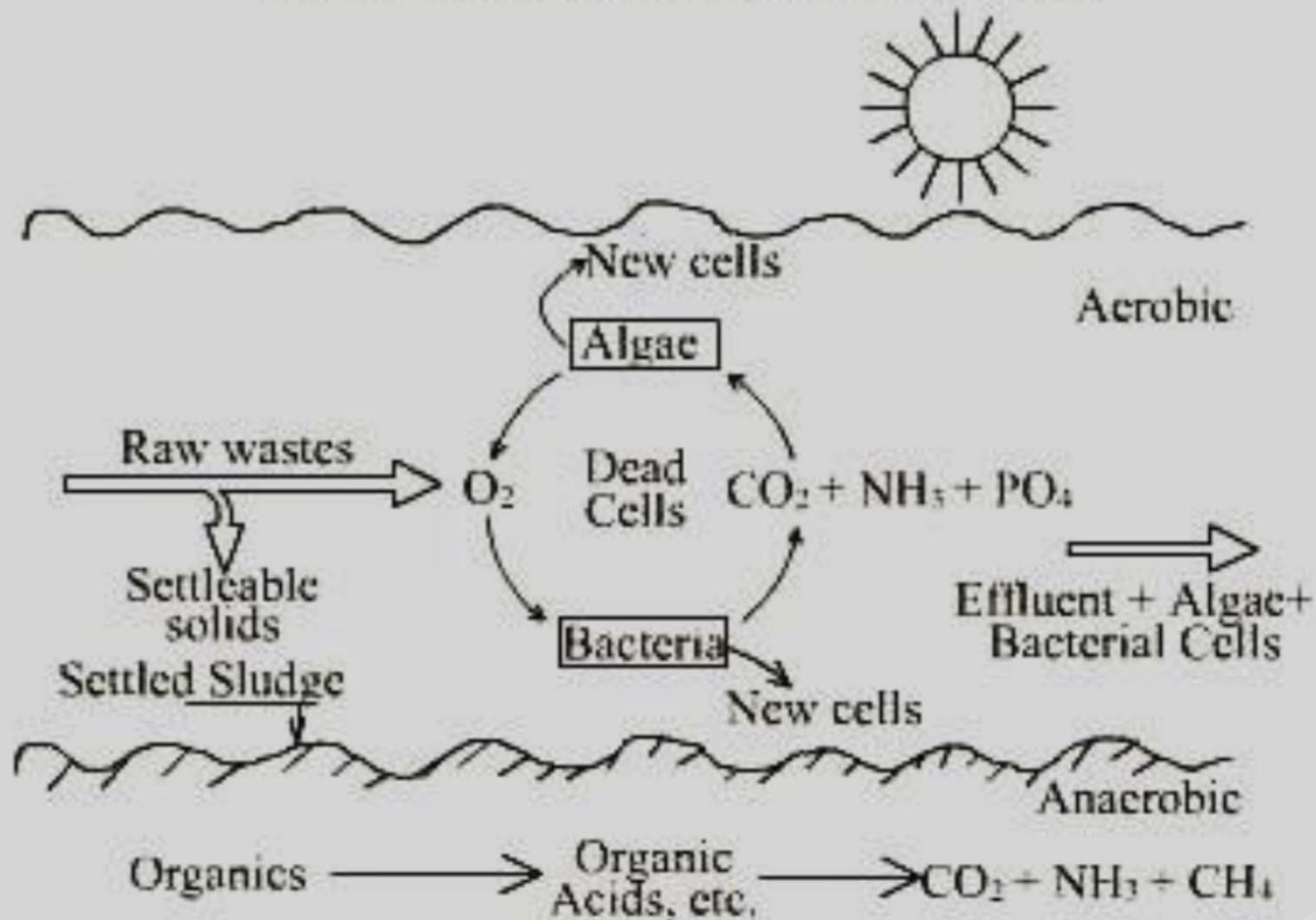
Stabilization ponds may be aerobic, anaerobic or facultative.

Aerobic ponds are shallow ponds with depth less than 0.5 m so as to maximize penetration of light throughout the liquid depth. Such ponds develop intense algal growth.

Anaerobic ponds are used as pre-treatment of high strength wastes. Such ponds are constructed with a depth of 2.5-5m as light penetration is unimportant.

Facultative pond functions aerobically at the surface while anaerobic conditions prevail at the bottom. They are often about 1 to 2 m in depth. The aerobic layer acts as a good check against odour evolution from the pond.

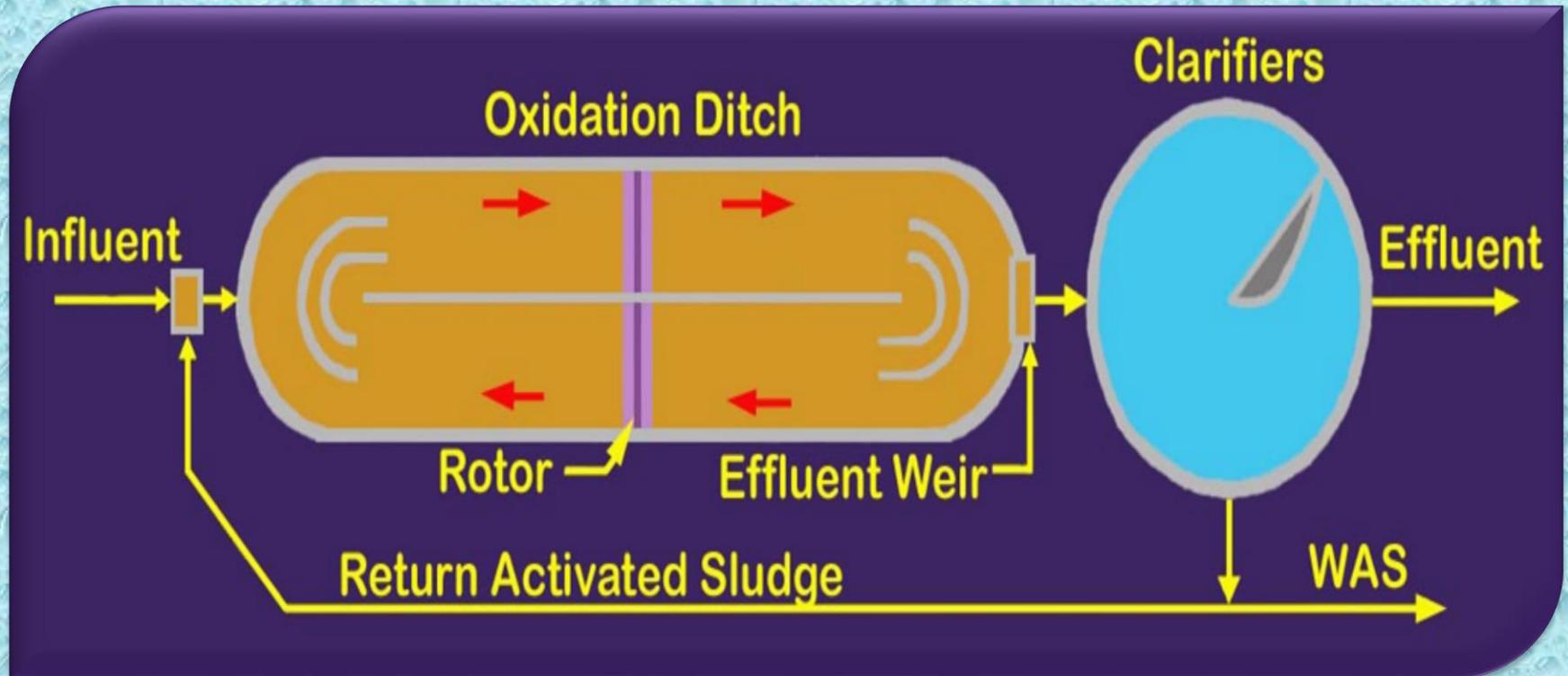
SYMBIOTIC RELATIONSHIP AND FUNCTIONING OF FACULTATIVE STABILIZATION POND



Oxidation Ditch

The oxidation ditch is a modified form of "extended aeration" of activated sludge process. The ditch consists of a long continuous channel oval in shape with two surface rotors placed across the channel.

A Typical Oxidation Ditch



A View of Oxidation Ditch



Tertiary Treatment Process

Tertiary treatment process consists of following process.

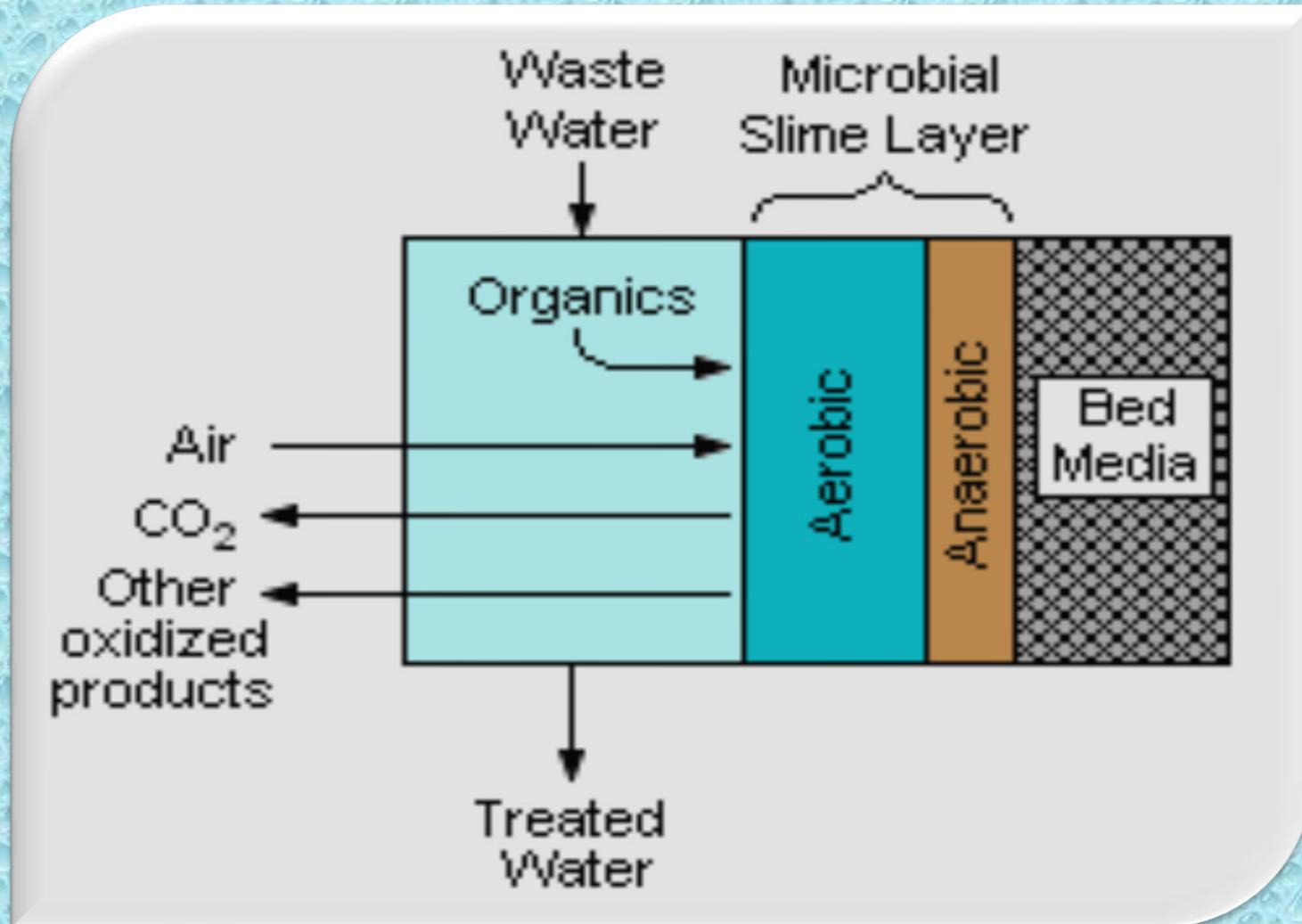
- Filtration Process (Trickling Filter)
- Disinfection Process

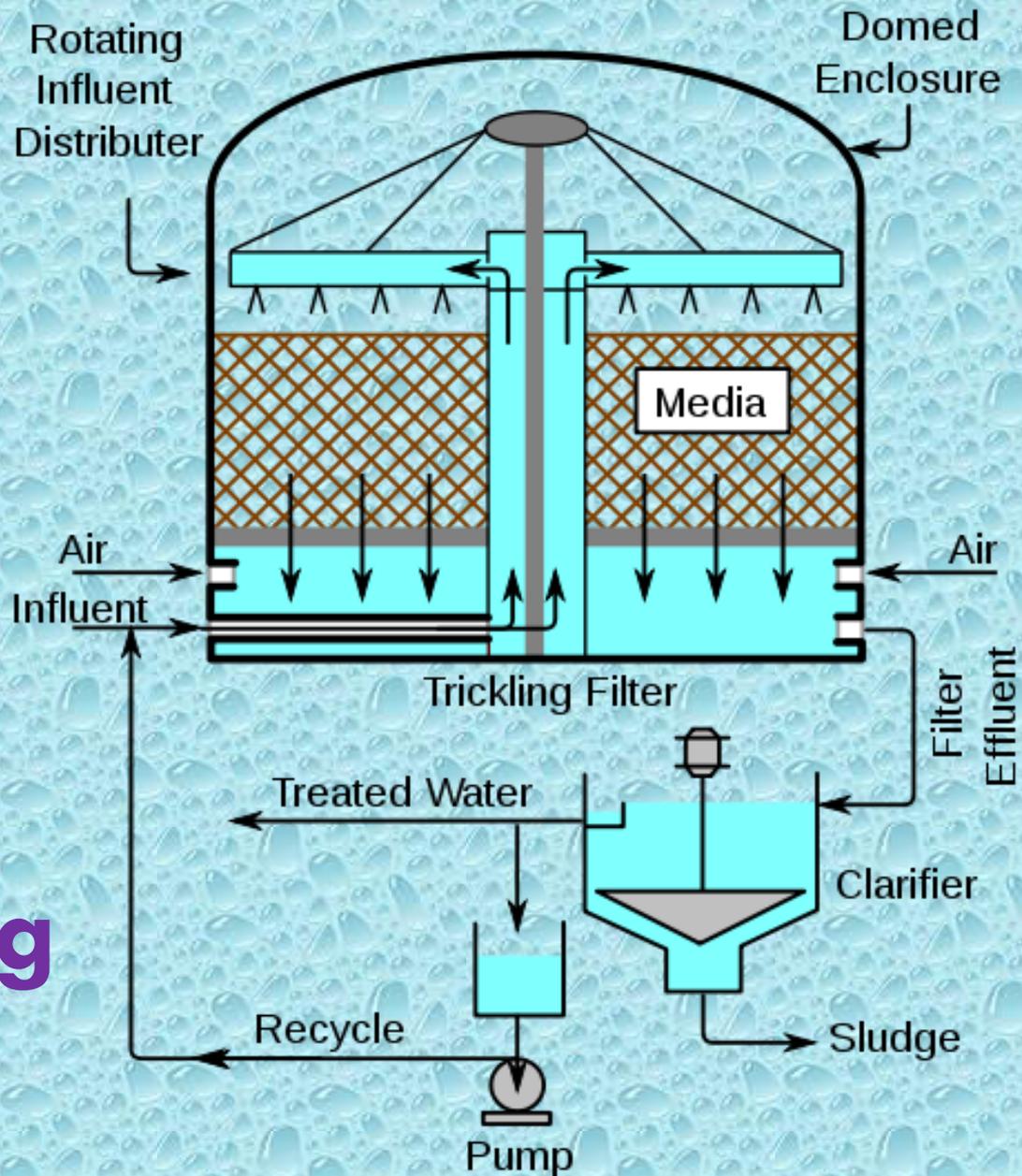
Trickling Filter is an attached growth process i.e. process in which microorganisms responsible for treatment are attached to an inert packing material.

Removal Efficiency of Trickling Filter

The Removal efficiency of Total Organic Carbon (T. O. C.) from Trickling Filter is greater than 90%

Working of Trickling Filter





Trickling Filter

Top view of Trickling Filter





**Thank
You**