

**Ministry of Higher Education and Scientific Research
Southern Technical University
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Water Pollution Control

For

**Students of fourth class
Department of Environment and Pollution Engineering
Engineering Technical College/Basrah**



By

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INTRODUCTION TO TREATMENT PROCESS

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Introduction to Treatment Process

Contaminant may be present as:

1. Floating or large suspended solid.
 - i. In water; leaves, branches, etc.
 - ii. In waste water; papers, rags, grit, etc.
2. Small suspended & colloidal solid.
 - i. In water; clay & silt particles, microorganisms.
 - ii. In waste water; large organic molecules, soil particles, microorganisms.
3. Dissolved solid.
 - i. In water; alkalinity, hardness, organic acids.
 - ii. In waste water; organic compounds, inorganic salts.
4. Dissolved gases.
 - i. In water; Carbon Dioxide, Hydrogen Sulphide.
 - ii. In waste water; Hydrogen Sulphide.
5. Immiscible liquids; e.g. oils and greases.

Methods of Treatment

There are three main classes of treatment process:

a. Physical process: - these methods depend essentially on Physical properties of the impurity.

e.g :- Particle size , specific gravity , and viscosity .

Typical example of this type of process is: screening, sedimentation, filtration and gas transfer.

b. Chemical process: - this method depends on chemical properties of the impurity or the chemical properties of added reagent.

e.g :- coagulation , precipitation , ion exchange.

c. Biological process: - these methods utilize biochemical reaction to remove soluble or colloidal impurities.

- Aerobic biological processes including biological filtration and activated sludge.
- Anaerobic oxidation processes are used for the stabilization of organic sludge and high strength organic wastes.

Treatment of Water

The various treatment method and nature of impurities removed by employing them are given in the table below:

Water Treatment		
N	Process	Impurity removal
1	Aeration	Tastes and odor removal, oxygen deficiency
2	Screening	Floating mater
3	Plain sedimentation	Large suspended solids
4	Coagulation	Fine Particle
5	Filtration	Colloidal Particles , Micro Organisms
6	Activated Carbon	Element causing tastes and odors
7	Softening	Hardness
8	Disinfection	Living organisms including Pathogens

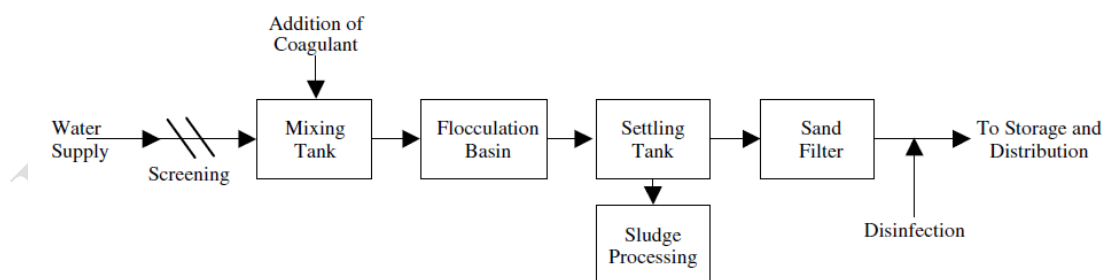


Figure (1) Typical Water Treatment Plant

Treatment of Sewage

a. Preliminary treatment :

This will make sewage fit for further treatment. Also, this process removes about 10% of total solids (inorganic).

- i. Screen
- ii. Shredder or comminutors
- iii. Grit chamber
- iv. Detritus tank

b. Primary treatment :

In this case attempts are made to remove the settleable organic matter.

Plain sedimentation tank < $\left\{ \begin{array}{l} \text{Removes 40\% total solids} \\ \text{Removes 30-40\% B.O.D} \end{array} \right.$

c. Final or complete treatment : (Biological Treatment)

Non-settleable and dissolved organic matter get removed. This process removes about 90% of total solids and 85% of B.O.D.

- i. Activated sludge process.
- ii. Trickling filter.
- iii. Intermittent filter.

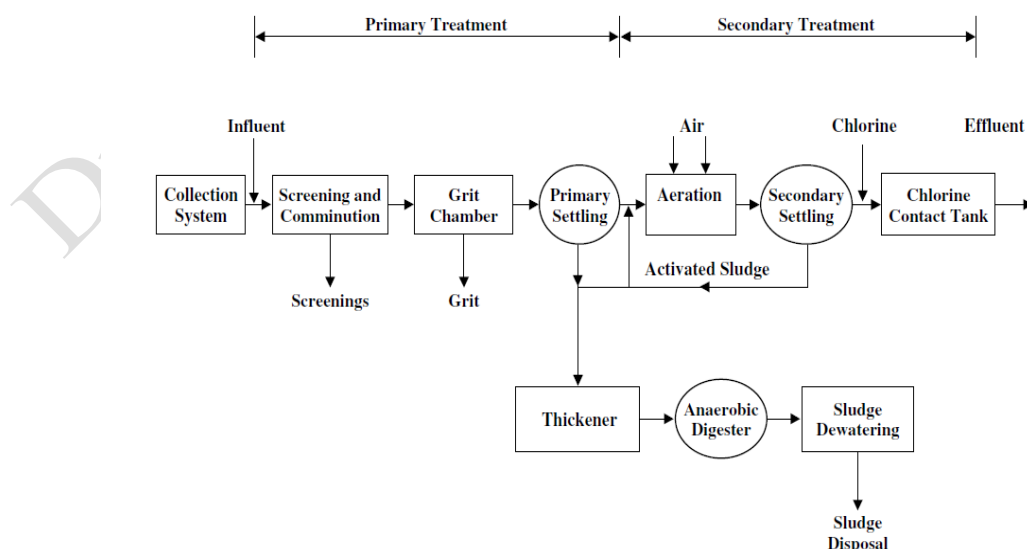


Figure (2) Schematic of Conventional Wastewater Treatment Process

Post Test :-

1- Sedimentation is a:

- a- Biological process
- b- chemical process
- c- Physical process
- d- other method

2- Coagulation is used to remove:

- a- Large suspended solids
- b- Fine particles
- c- Taste and odour
- c- Hardness

3- Disinfectant is a chemical substance used for:

- a- Living objects
- b- Nonliving objects
- c- Living and nonliving objects
- d- none

4- Preliminary treatment removes about:

- a- 10% of total inorganic solid
- b- 10% of bacteria
- c- 10% of total organic solid
- d- all of above

5- Contamination:

- a- is the opposite of sterility
- b- means sterility
- c- Always air borne
- d- can not be minimized

key Answer :-

1. c
2. b
3. a
4. a
5. a

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