Ch-18-Wastewater Story

Components and Sources of Sewage

Water Treatment

Sanitation and Disease



Components and Sources of Sewage

Water is an indispensable resource and is also present in abundance on the earth surface. The water which is utilized and going down the drains from sinks, showers, toilets, laundries is dirty and is called wastewater. This wastewater if left untreated may lead to water pollution.

Sewage is the wastewater containing solid and liquid wastes and pollutants. It is produced by humans from homes, industries, hospitals, offices and other places that use water for their various processes. A network of big and small pipes called sewer transports the waste water to the point of disposal. This is called sewerage.



Water Treatment

Larger pipes carry away the wastewater from your house to the line of sewer. Typically, these pipes are black-coloured iron pipes that are larger in size than the pipes that supply water. They are usually about 5 inches in diameter. These pipes are known as sewer pipes. The wastewater flows by gravity, rather than pressurized pipe flow, in the sanitary sewer pipes.



Sewer pipe

The wastewater is treated in the wastewater treatment plant and to make it clean from the physical, chemical and biological contaminants. The process of removing the contaminants from sewage water is done in various stages. This entire process is known as the sewage water treatment process.

Wastewater treatment process is carried out in various steps. These are described below:-

Bar screens

- The main purpose of the installation of the bar screens is to remove floating matter of comparatively large size like the rags, sticks, cans, plastic packets, napkins, papers etc.
- If such materials are not removed; they will choke up the small pipes or affect the working of sewage pumps.
- Screens should preferably be placed before the grit chambers. Depending upon the size of the openings, screens may be classified as coarse, medium and fine screens.



Bar screens

Grit sand removal chambers



- Grit in sewage is obtained from domestic sewage, floors of garages and service stations etc.
- The purpose of grit chamber is to remove grit, sand and other such inorganic matter from sewage.
- Velocity of flow in grit chamber is decreased to such an extent that heavier inorganic materials settle down at the bottom and lighter organic materials are carried forward for further treatment.

Clarification



Clarification tank

- The oldest and most widely used form of water and wastewater treatment uses gravity settling to remove particles from water.
- The shape of the tanks can be round, square or rectangular.
- Sedimentation takes place in the primary settling tanks and is relatively simple and inexpensive.
- The organic matter like faeces thus settled down is called sludge. The floatable solids like oil and grease are removed with the help of skimmer in this tank.
- Here air is blown by an aerating device through the bottom which solidifies grease and causes it to rise to the surface from where it is removed.
- > The water thus obtained is called clarified water.

Aeration

- Aeration Basins supply large amounts of air to the mixture of primary wastewater and helpful bacteria and the other microorganisms that consume the harmful organic matter.
- The growth of the helpful microorganisms is increased by vigorous mixing of air (aeration) with the concentrated microorganisms (activated sludge) and the wastewater.



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- Adequate oxygen is supplied to support the biological process at a very active level.
- The ratio of food (organic matter) to organisms to oxygen is continually monitored and adjusted to meet daily variations in the wastewater.
- Eventually, the microbes start to settle down at the bottom of the tank as activated sludge.
- The process of removal of water starts from the top of the tank. The activated sludge that settles down at the bottom of the tank is about 97% water.
- This water is removed by machines or sand-drying beds. Dry sludge can be used as manure.
- The water treated through this process contains low organic material. It is therefore discharged into the sea or river or into the ground for natural purification.

Chlorination

Before releasing the water treated in this manner, chlorination is necessary in order to make it germ-free. Chlorine tablets are thus added to it. This process is known as **chlorination**. Chlorine acts as a disinfectant. It is harmless to humans and other animals.

Measures taken at home to minimize waste

- 1. Cooking oil and fats should not be thrown down the drain as it can harden and block the pipes. In an open drain the fats clog the soil pores reducing its effectiveness in filtering water.
- 2. Microbes help in purifying water. We should not throw chemicals like paints, solvents, insecticides, motor oil, and medicines into the drain. It may kill these microbes.
- 3. Large sized wastes like soft toys, cotton, sanitary towels, etc. choke the drains and do not allow free flow of oxygen thus they hamper the degradation process and hence should be avoided.

Alternative arrangement for sewage disposal

Low cost and on-site sewage disposal systems such as **septic tanks**, **chemical toilets**, **composition pit** etc are very suitable for isolated buildings or a small cluster of houses. The excreta collected in these toilets can be used for generating biogas.



Septic tanks

In the pretreatment portion of a the septic system, many of contaminants are removed from the wastewater in order to prepare it for final treatment and discharging into the environment. Contaminants in the wastewater include harmful bacteria that can cause illness, as well as nitrogen and phosphorus that can stimulate algae growth in water bodies.



Septic tank

The main unit of the pretreatment portion of the system is a tank - commonly called a septic tank. Septic tanks are used to settle out solids and partially treat wastewater before it reaches the distribution system.

Vermin processing toilet

Vermin processing toilet is a type of toilet in which human excreta is treated through earthworms. Earthworms convert human excreta into **vermin cake** that is a good variety of natural manure.

Chemical toilets

A chemical toilet is a toilet using chemicals to deodorize the waste instead of simply storing it in a hole, or piping it away to a sewage treatment plant. These toilets are usually found in airplanes, trains and caravans. Formaldehyde is mixed to the toilet water in order to disinfect the waste. Nowadays nitrate based chemicals are used that act biologically.

On-site human waste disposal technology

Excreta from the toilet seats flow through covered drains into a biogas plant. The biogas produced is used as a source of energy.



Sanitation and Disease

Proper sanitation facilities are therefore very important. Inadequate sanitation can cause serious problems of pollution and may pose several health hazards. The human excreta must be disposed of properly otherwise epidemics could break out.

Awareness should be created about the necessity for personal social hygiene. Initiative should be taken by all to keep toilets at public places clean. We should not scatter litter anywhere.

Water and soil are polluted by human excreta. Water pollution gives rise to several water-borne diseases such as hepatitis, dysentery, cholera, typhoid, polio, meningitis etc.

