MICROBES IN HUMAN WELFARE

MICROBES IN SEWAGE TREATMENT

Microbes in Sewage Treatment-

Large quantities of waste water are generated every day in cities & towns.

Major component of this waste water is human excreta.

Municipal waste water is also called sewage.

Sewage contain large amount of organic matter & pathogenic microbes.

Sewage can't be directly discharged into water bodies, it is firstly treated in sewage treatment plants (STPs).

Treatment of sewage is done by heterotrophic microbes naturally present in sewage.

Sewage treatment is carried out in two stages-

Primary Treatment / Physical Treatment

Physically removal of large & small particles from sewage by filtration and sedimentation.

It is done in stages-

Floating debris is removed by sequential filtration.

Grit (soil & Small pebbles) are removed by sedimentation. (Primary sludge) & then supernatant from effluents.

Effluent from primary settling tank is taken for secondary treatment.

Secondary Treatment / Biological Treatment

Primary effluent is passed into large aeration tanks, where it is aerated & consistently agitated. It allow vigorous growth of useful microbes into flocs. (Bacteria + fungal filaments form mesh like structures).

While growing these microbes consume major part of organic matter, reducing BOD (Biochemical oxygen demand) of effluent.

If O_2 supply to activated sludge flocs is decreased then centre of flocs will become anoxic, which would cause death of bacteria & eventually breakage of flocs.

BOD refers to amount of O_2 that would be consumed if all the organic matter in 1 lit. of water is oxidized by bacteria.

BOD is measure of organic matter present in the water. Greater the BOD is, more is its polluting potential.

Once the BOD of sewage is reduced significantly, effluent is passed into settling tank, where bacterial flocks are allowed to sediment. This sediment is called activated sludge.

Small part of activated sludge is pumped back into aeration tank to serve as inoculum.

Remaining major part of sludge is pumped into large tanks called anaerobic sludge digesters; here anaerobic bacteria digest the bacteria & fungi in sludge. During digestion biogas (CH_4, H_2S, CO_2) is produced.

Effluents from secondary treatment plant is released in natural water bodies.

Sewage

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Separation of floating debris in sequential filtration.

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Grit (Soil & Small pebble) removed by sedimentation (Primary sludge)

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Supernatant (Effluent) taken for secondary treatment

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Effluent sent to aeration tanks & development of flocs (Bacteria + Fungi)

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Decreased BOD of Effluents.

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Effluents sent to settling tanks.

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Flocs settle. (Activated sludge)

Some floc is added to aeration chamber to act as

Flocs sent to anaerobic sludge digestors

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Anaerobic bacteria digest sludge with production of biogas.

Millions of Gallons of waste water is treated using microbes all over the world.
Till date, no man made technology has been able to rival the microbial treatment of sewage.
Ministry of environment & forest has initiated Ganga Action plan & Yamuna action plan to protect these major rivers from pollution.

Figure : Secondary treatment

Figure : An aerial view of a sewage plant