Anaerobic Sludge Digester

CE10B059  Teketi Ujwala Raj
CE08B041  Subramanyam Matta
CE08B062  R Srikanth
CE10B071  E Sai Tejo Kiran
Working of the system

- Anaerobic digestion is a bacterial process that breaks down organic materials within waste in the absence of oxygen.
- It is generally run in closed tanks.
- Biomass consisting of sewage or processing wastes is mixed with water and fed into the digester without air.
- This unit operation employs microorganisms to convert industrial waste water into readily disposable digested sludge.
Generalised equation

• Organic Matter + Combined Oxygens \to Anaerobic Microbes + New Cells + Energy for life processes + CH4 + CO2 + Other gases

• The combined oxygens consist of
  ✓ Carbonates
  ✓ Sulphates
  ✓ Nitrates
  ✓ Phosphates
Simple Activated Sludge Plant With Digester (4 Cells)
Treatment Units

Pre-treatment units
1) Electron beam irradiation
2) Mechanical grinding
3) Ultrasonic disintegration
4) Chemical methods
5) Thermal pre-treatment

Post treatment units
1) Denitrification
2) Post – Aeration.
3) Screening
Advantages

- Methane recovery by most of the microbial produced can be used as alternate fuel source.
- Reduces production of landfill gas.
- Sludge occupies less volume, easier to dry.
- Lower operating costs
- Process stability (high loads can be treated but anaerobic sludge can also be preserved for prolonged periods without any feeding)
Disadvantages

- Accumulation of heavy metals and contaminants in sludge.
- Narrow temperature control range.
- Sulphurous compounds can lead to odour.
In comparison with aerobic digestion

1. Stability in the ability to dewater to reduce sludge volume.
2. High levels of BOD
3. High levels of phosphorous.
4. Useful by-product such as **methane** gas is produced
5. More reduction in volatile solids
6. Favorable economics for larger wastewater treatment plants.
Area and cost

- It requires larger vessels because it takes time for the bacteria population to grow and stabilize.
- High capital costs
- Lower operating costs, especially energy costs
- Maintenance and operation is not as easy as aerobic digestion
- The digester operates around 35-27 degrees Celsius
Rating – 8/10

• Moderately efficient plant with high capacity with better treatment when compared to aerobic digestion.
• It can make landfills easier to manage by removing potentially hazardous organic wastes.
• It avoids the generation of biogas in landfills and can recover this biogas for further use.
• It contributes to recycling goals set by industries and government agencies, and the end product can often be used as soil conditioner.