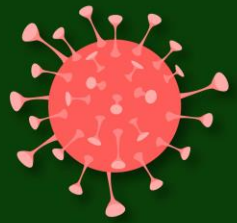
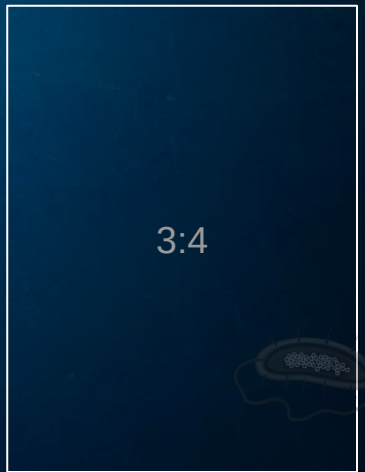
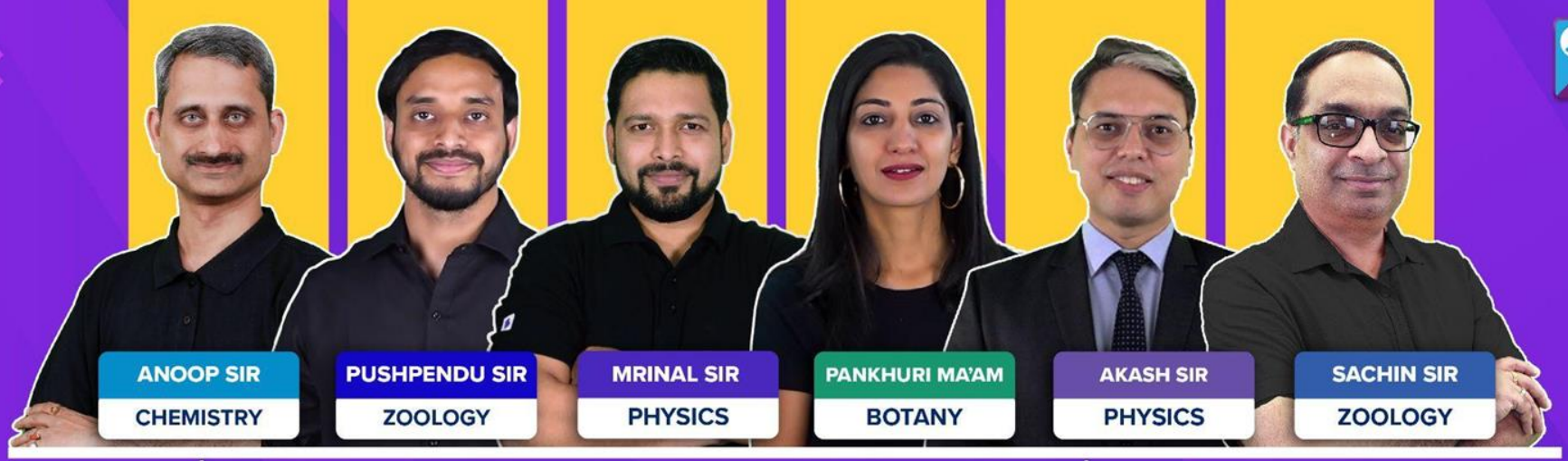
MICROBES IN HUMAN WELFARE - L 2



BOTANY

PANKHURI MA'AM





MISSION MBBS

BIO की रण NEETi

CHEMISTRY SUPER 30

PHY की रण NEETi

MON - SAT | 12 PM - 8 PM

Aakash Live Webinars

Aakash + BYJU'S

6 Months NEET Strategy till May 2023

Dr. Sachin Kapur
Biology Expert - NEET

20th November, 2022

12:30 pm

ANTHE

AAKASH NATIONAL TALENT HUNT EXAM

Your Gateway To Success

For Class VII to XII

Current Students & Passouts

FREE

SMART PLAYLIST

FREE NEET RESOURCES

MISSION MBBS 2023 & 2024

- ALL YOUTUBE LECTURES
- ANNOTATED SESSION NOTES
- DAILY PRACTICE QUESTION & ANSWERS

LINK IN DESCRIPTION

Aakash + BYJU'S

Aakash BYJU'S

NEET STUDENTS' SURVEY

LINK IN DESCRIPTION

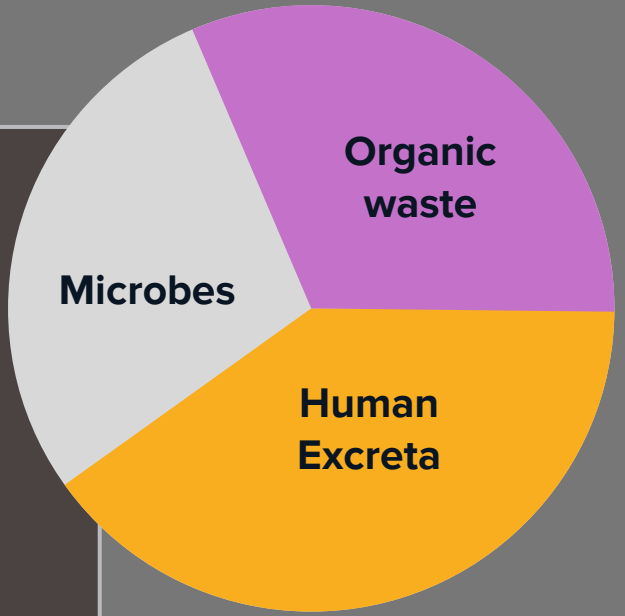
https://t.me/neetaakashdigital

3:4

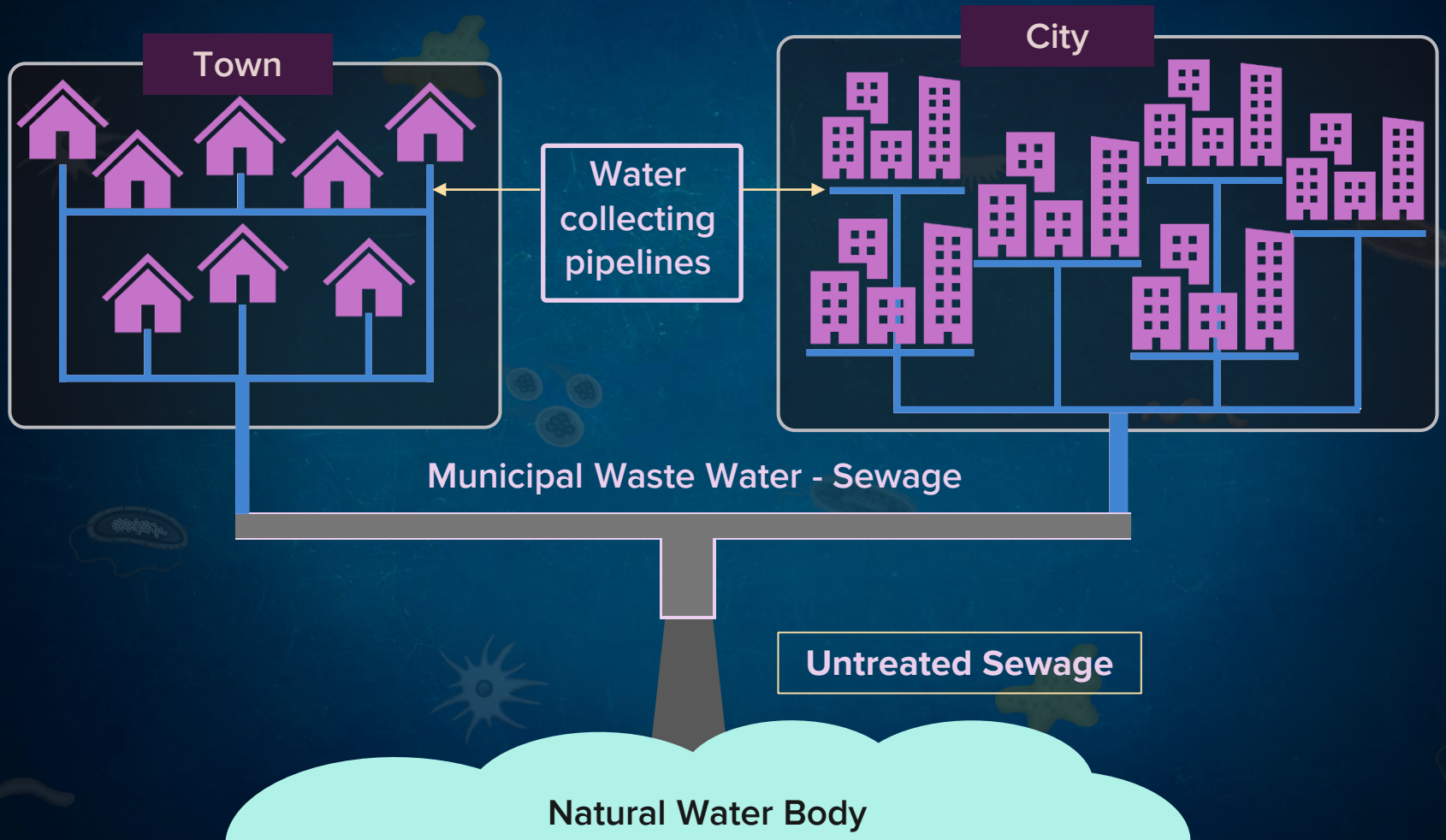

3:4

Sewage

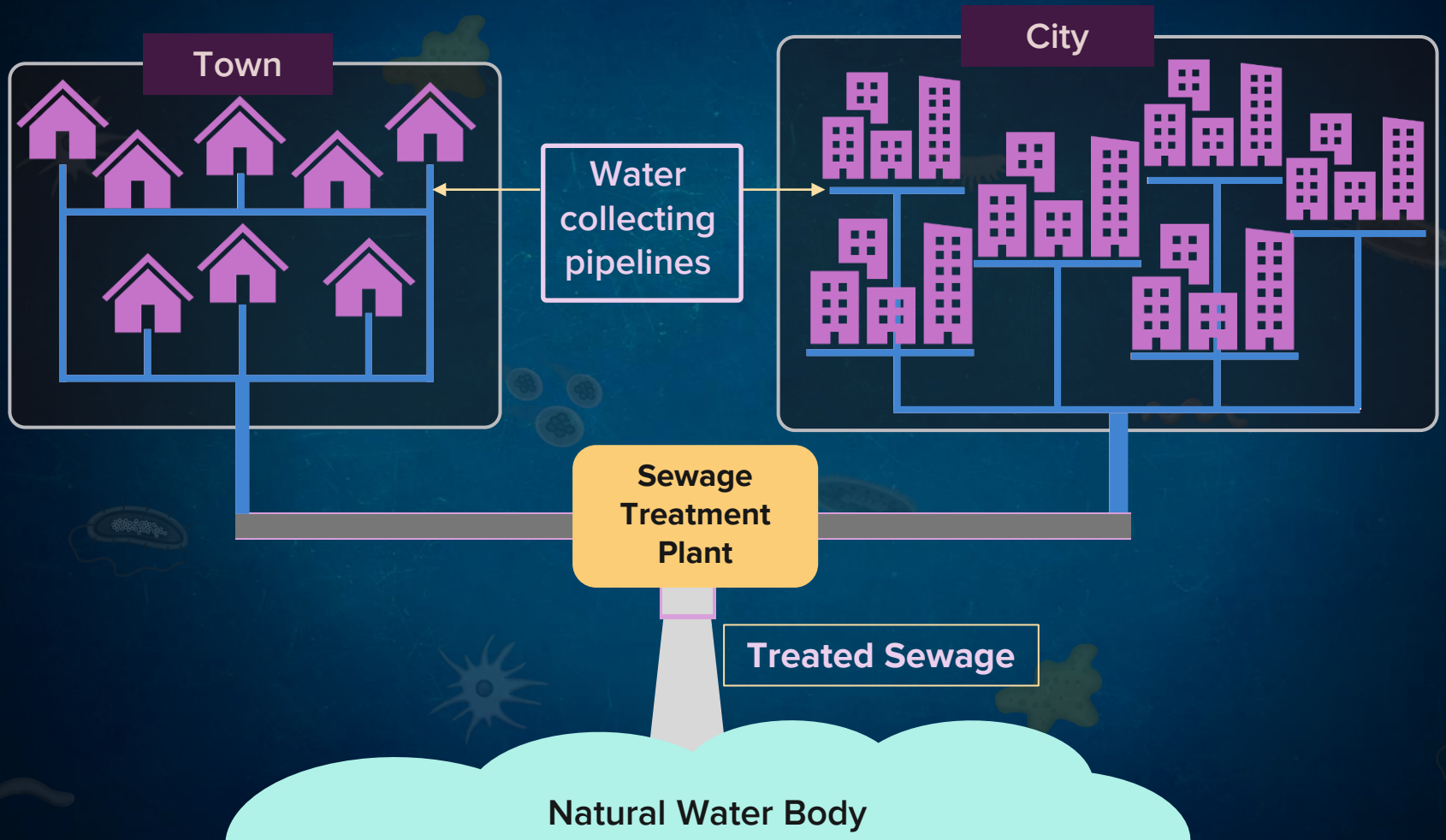
- Municipal waste water consists of organic wastes and microbes
- Many of these microbes are pathogenic
- major component- human excreta



Waste Water

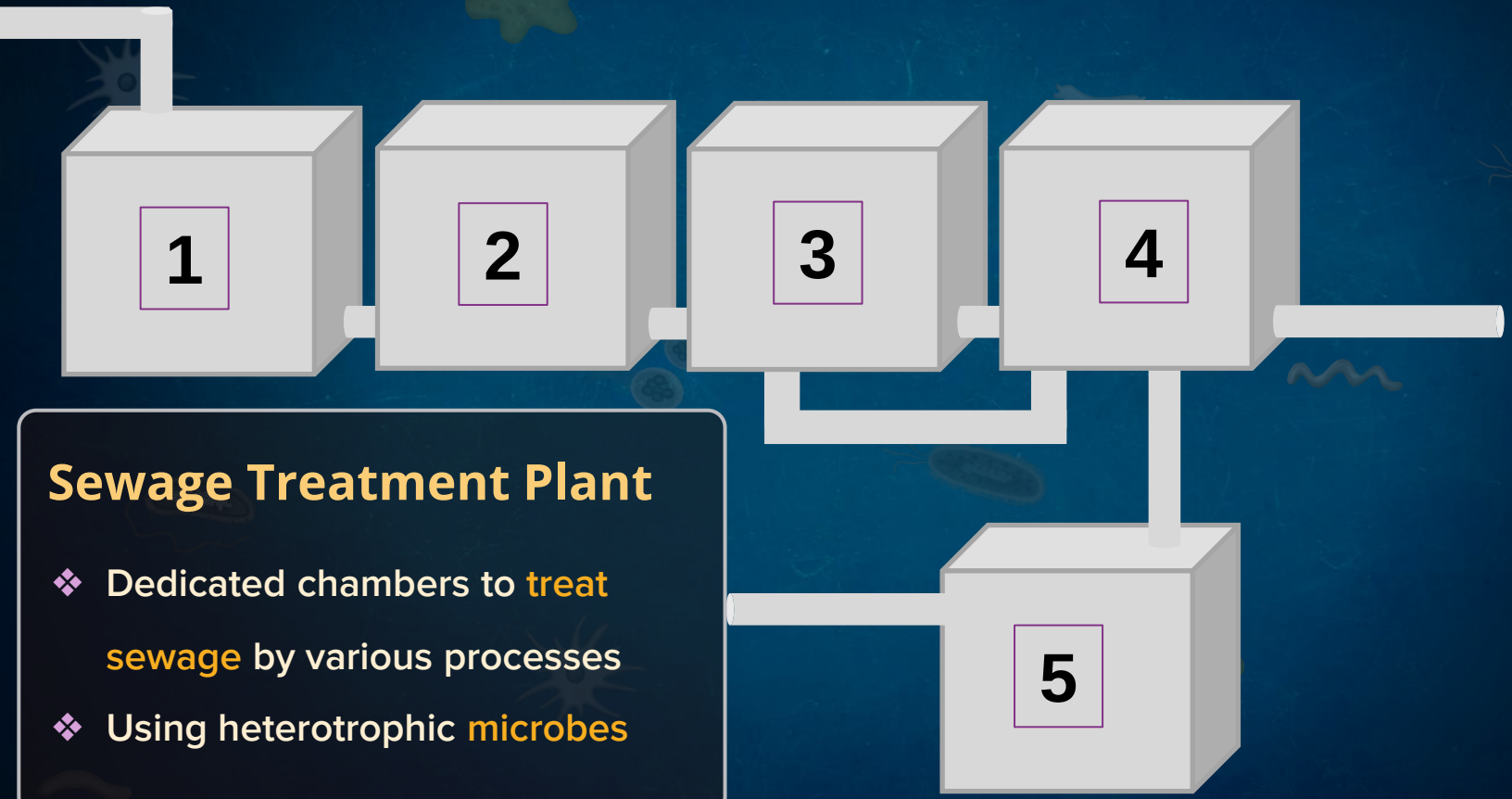

Town
City
Water collecting pipelines
Municipal Waste Water - Sewage
Untreated Sewage
Natural Water Body

Waste Water


Town
City
Water collecting pipelines
Sewage Treatment Plant
Treated Sewage
Natural Water Body

Sewage Treatment Plant

Sewage Treatment Plant



Sewage Treatment Plant

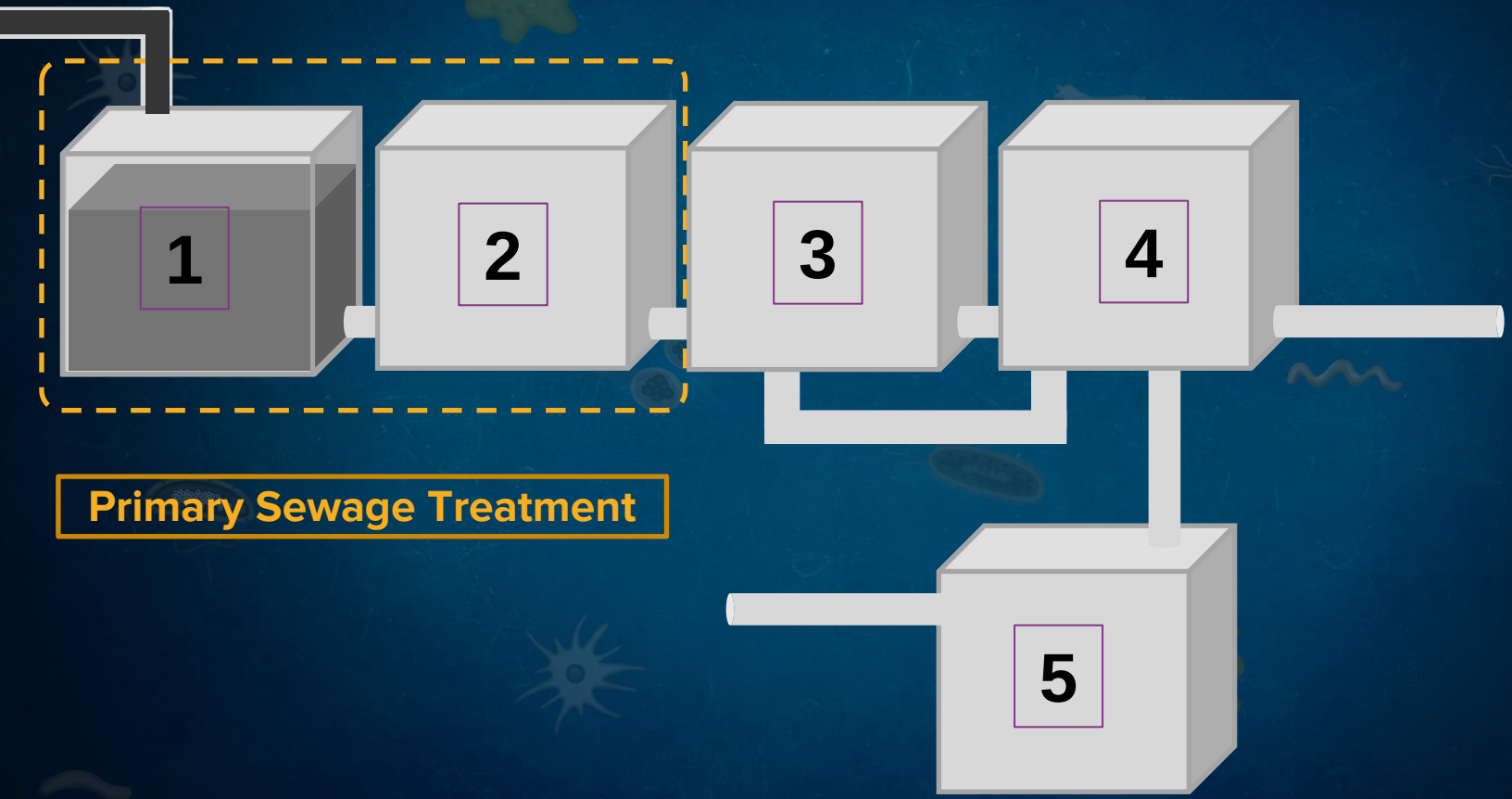
- Dedicated chambers to treat sewage by various processes
- Using heterotrophic microbes

Sewage Treatment

Primary Sewage Treatment

- Physical removal of particles
- Through filtration and sedimentation

Sewage Treatment Plant



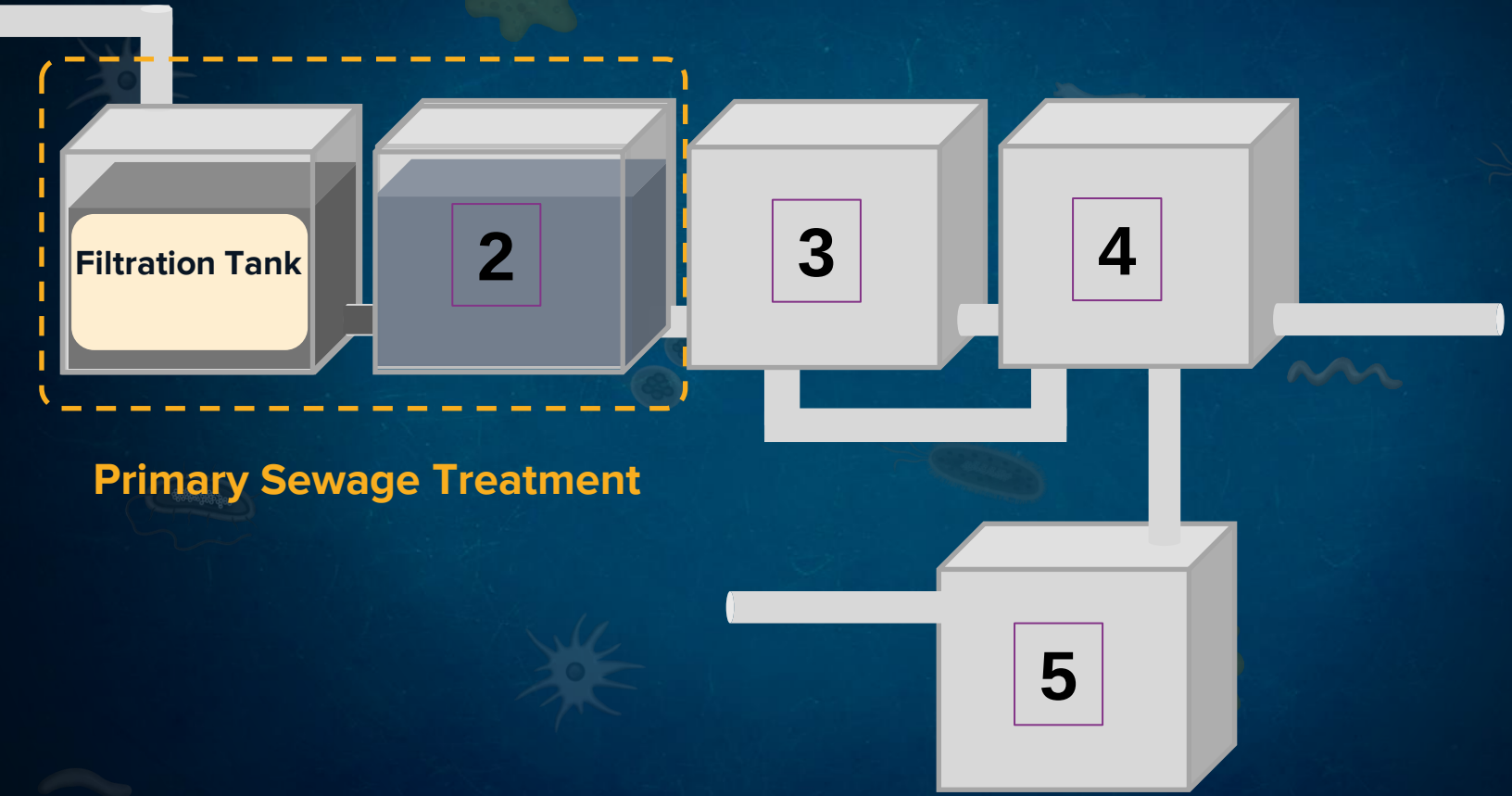
Primary Sewage Treatment

Filtration Tank

Filtration Tank

- Removal of **floating, solid debris**
- Method – **Sequential filtration**

Sewage Treatment Plant

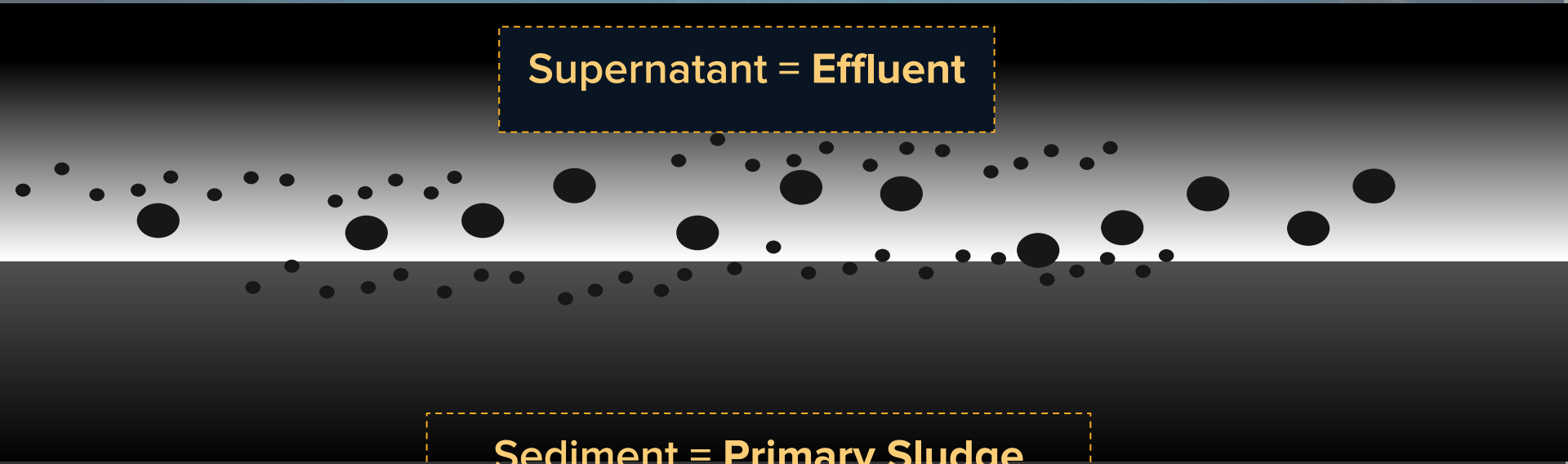


Primary Sewage Treatment

Primary Sewage Treatment

Sedimentation Tank

- Grits
- Pebbles



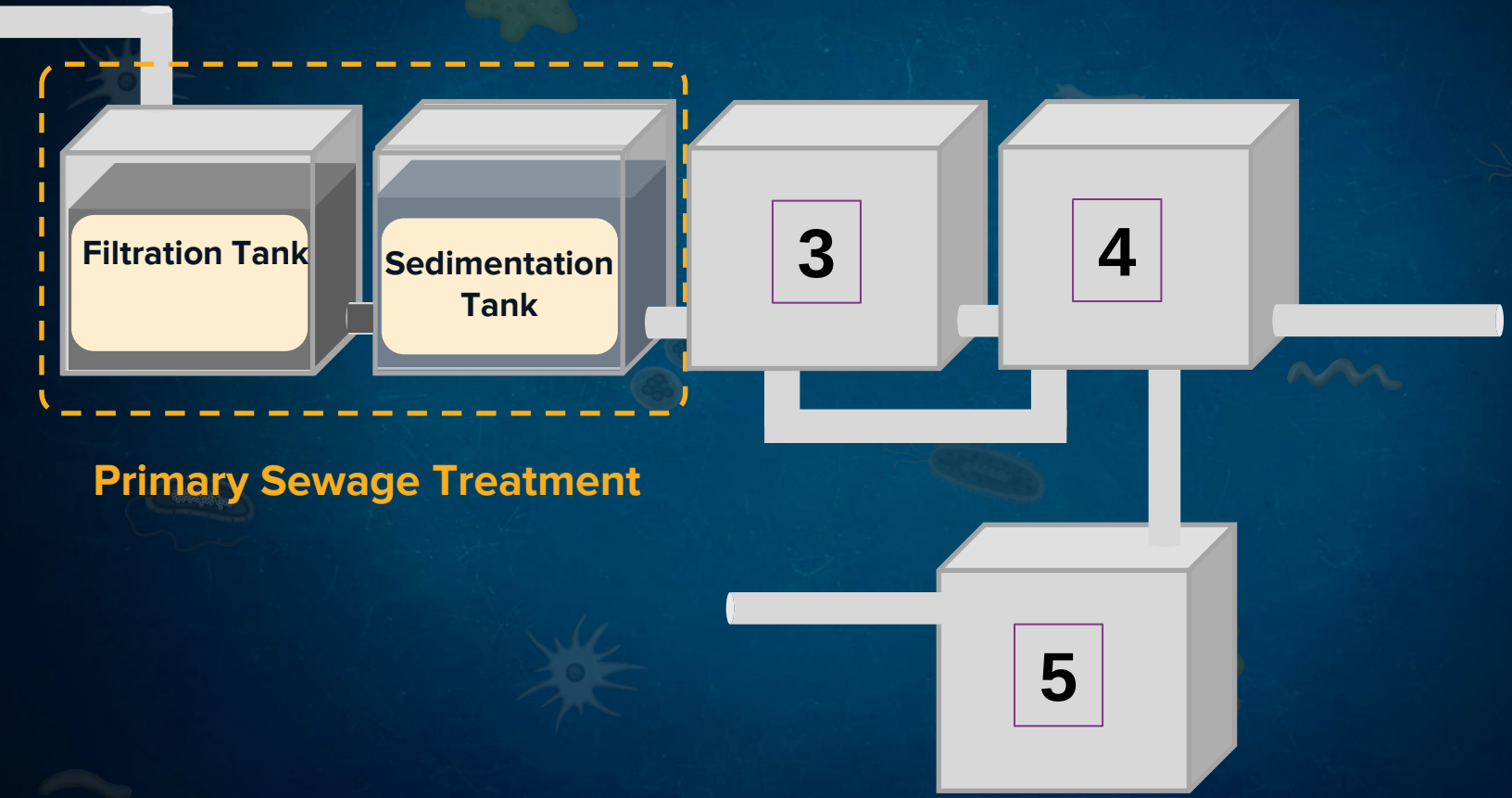
Primary Sewage Treatment

Sedimentation Tank

Sedimentation Tank

- Settling down of all small **floating particles, solid debris**
- Method – **Sedimentation**
- **Primary Sludge –** all settled down sediment
- **Effluent –** Supernatant floating sewage

Sewage Treatment Plant



Primary Sewage Treatment

Sewage Treatment

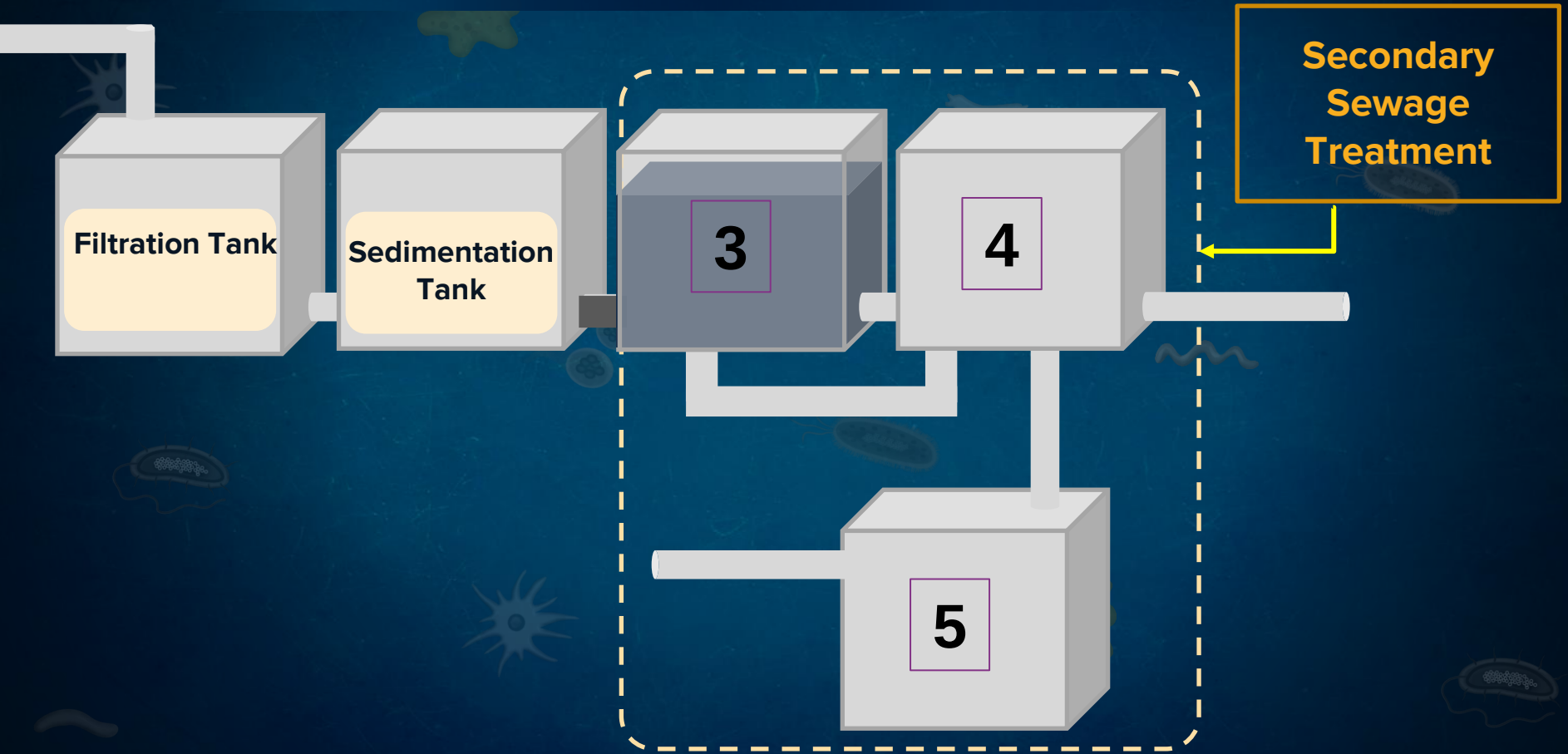
Primary Sewage Treatment

Secondary Sewage Treatment

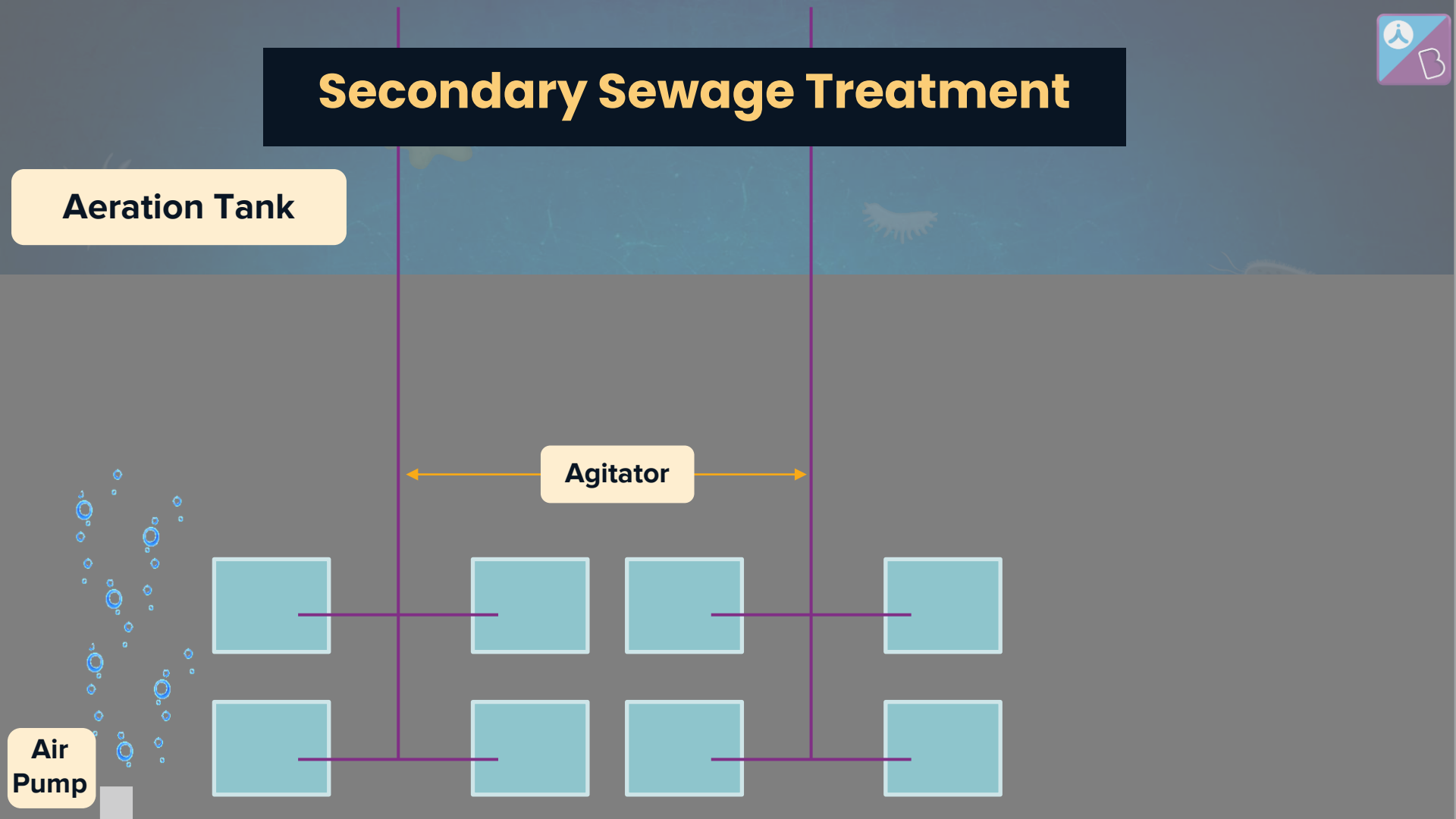
Secondary Sewage Treatment

- Removal of organic matter from the sewage through microbial action

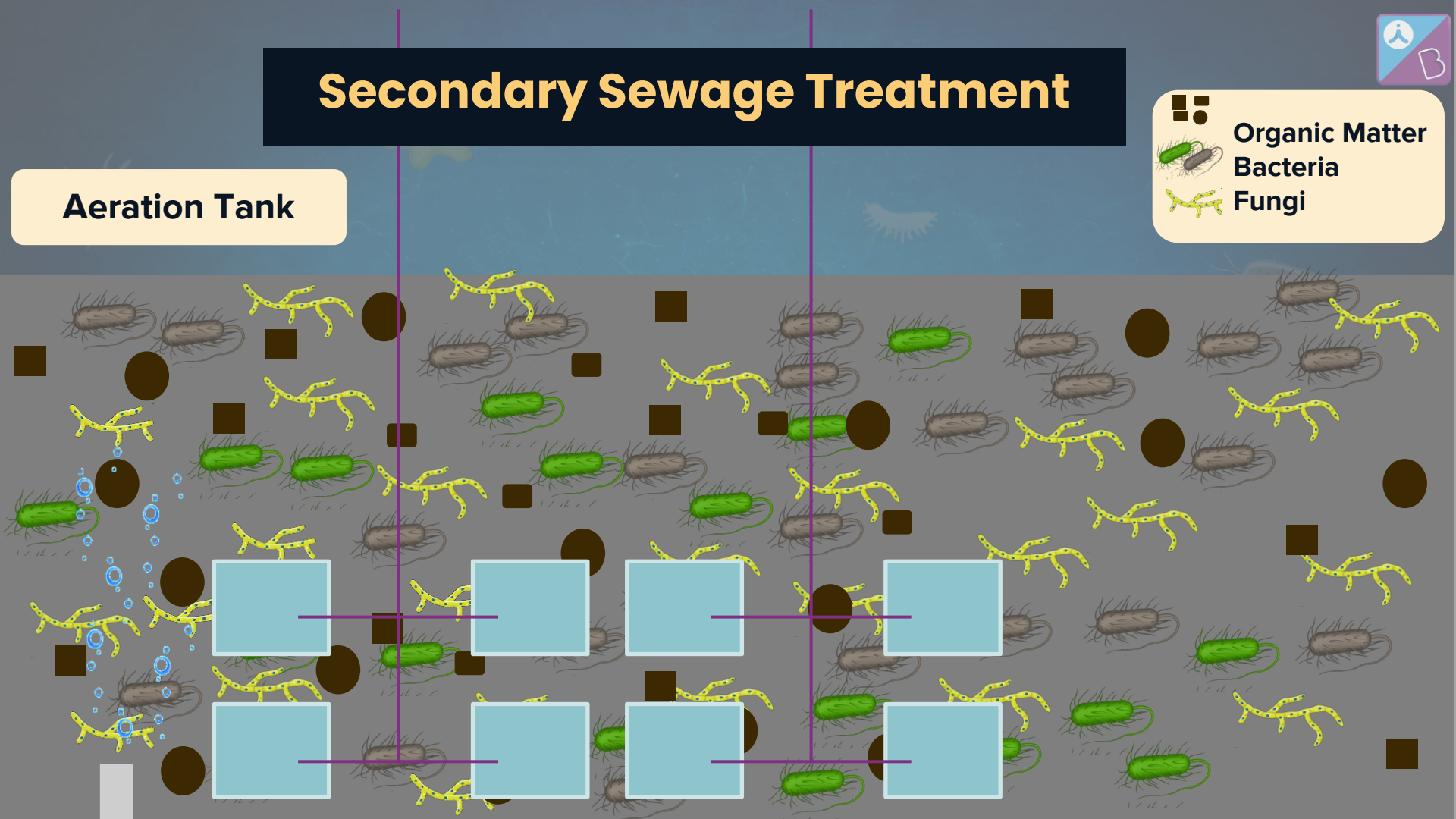
Sewage Treatment Plant



Secondary Sewage Treatment



Secondary Sewage Treatment



Secondary Sewage Treatment

Aeration Tank

Organic Matter
Bacteria
Fungi

Aeration Tank

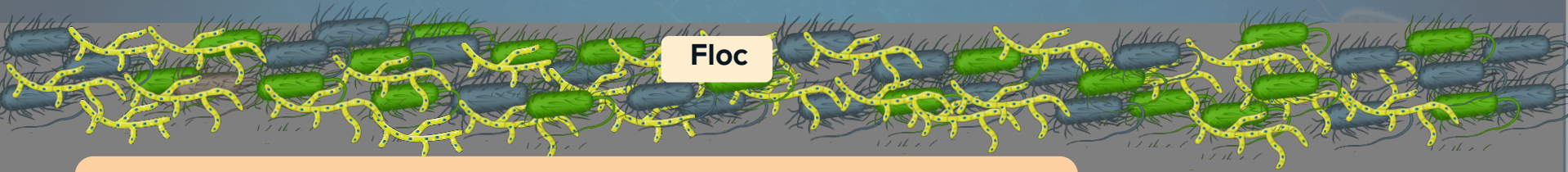
Mechanical agitation and **pumping of air**

increases number of **aerobic microbes**

Secondary Sewage Treatment

Organic Matter
Bacteria
Fungi

Aeration Tank



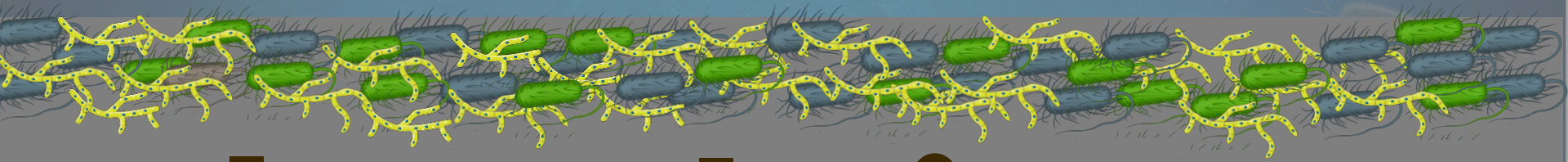
Aeration Tank

- **Floc** (mess like structure from **masses of bacteria** associated with **fungal filaments**) formation

Secondary Sewage Treatment

Organic Matter
Bacteria
Fungi

Aeration Tank



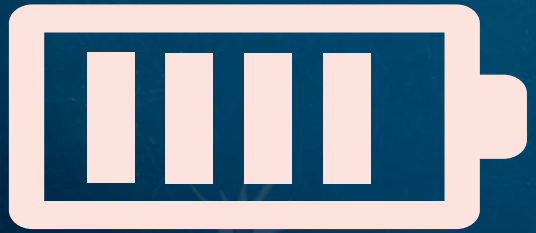
Aeration Tank

Microbial floc consumes major part of **organic matter**

How does water quality improve if microbes consume organic matter?

Secondary Sewage Treatment

Microbes consuming the organic matter decreases the level of Biochemical Oxygen Demand (BOD)



Biochemical Oxygen Demand (BOD)

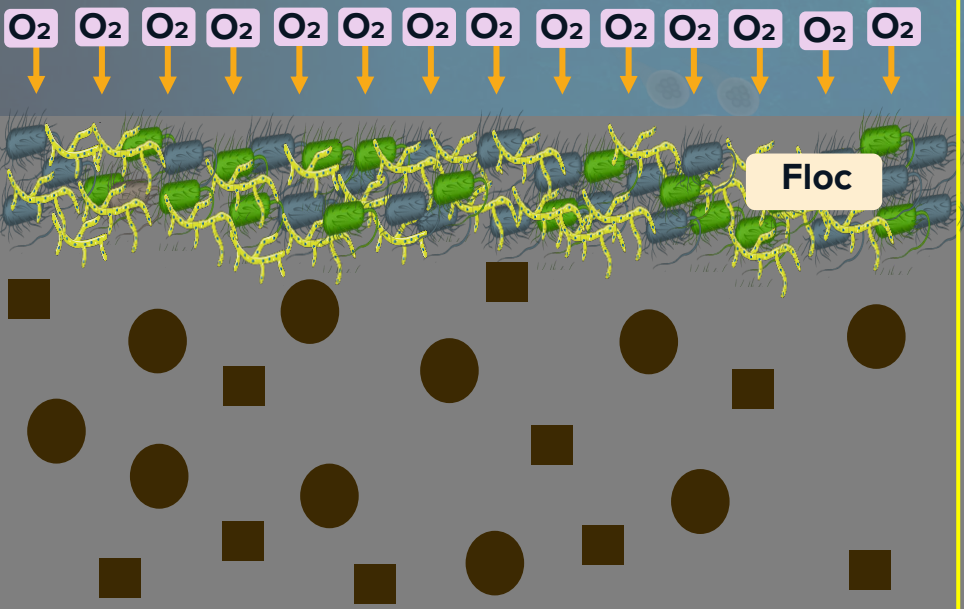
What is Biochemical Oxygen Demand (BOD)?

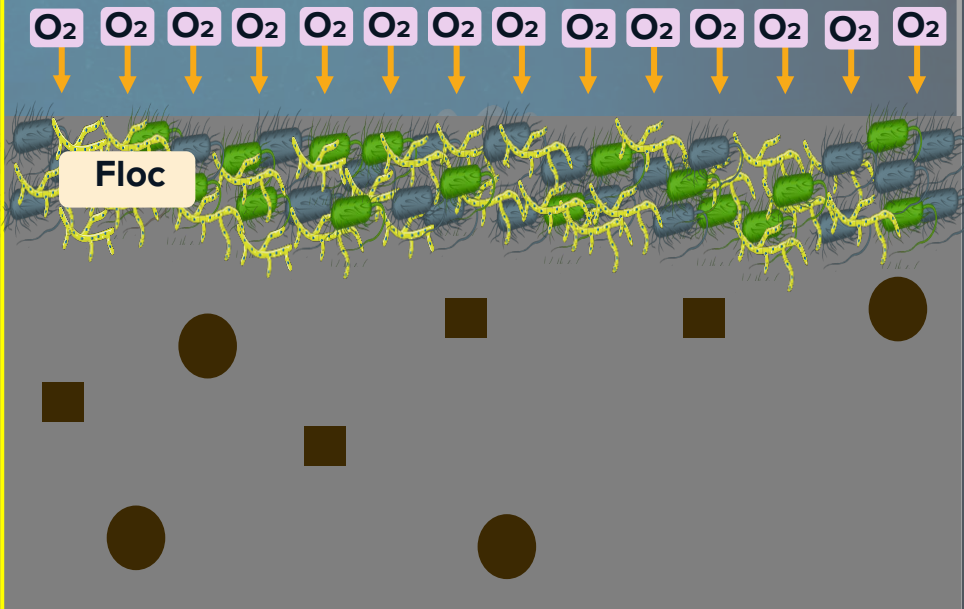
Secondary Sewage Treatment

Scene A

Scene B

Organic Matter
Bacteria
Fungi





Secondary Sewage Treatment

Scene A

Scene B

Organic Matter
Bacteria
Fungi

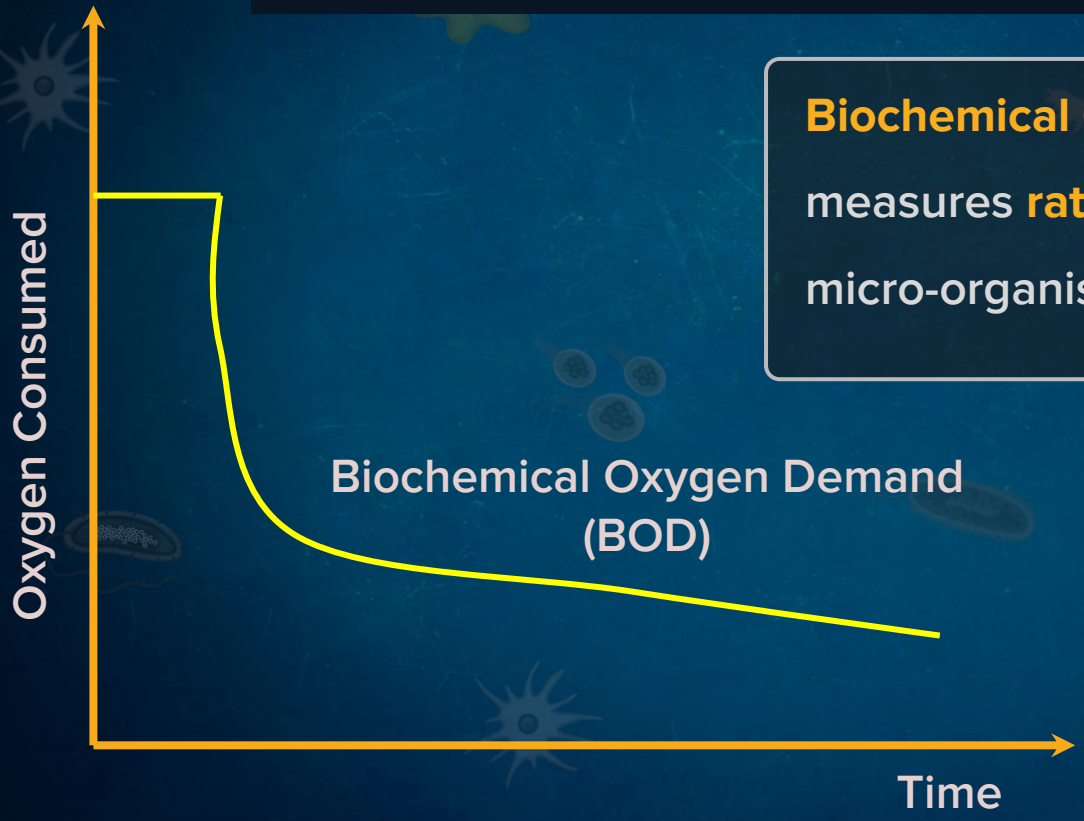
Biochemical Oxygen Demand (BOD)

Amount of oxygen consumed by the bacteria for oxidation of all the organic matter in one liter water

O_2 O_2 O_2

Secondary Sewage Treatment

Biochemical Oxygen Demand (BOD) test measures **rate of uptake of oxygen** by micro-organism in a sample of water



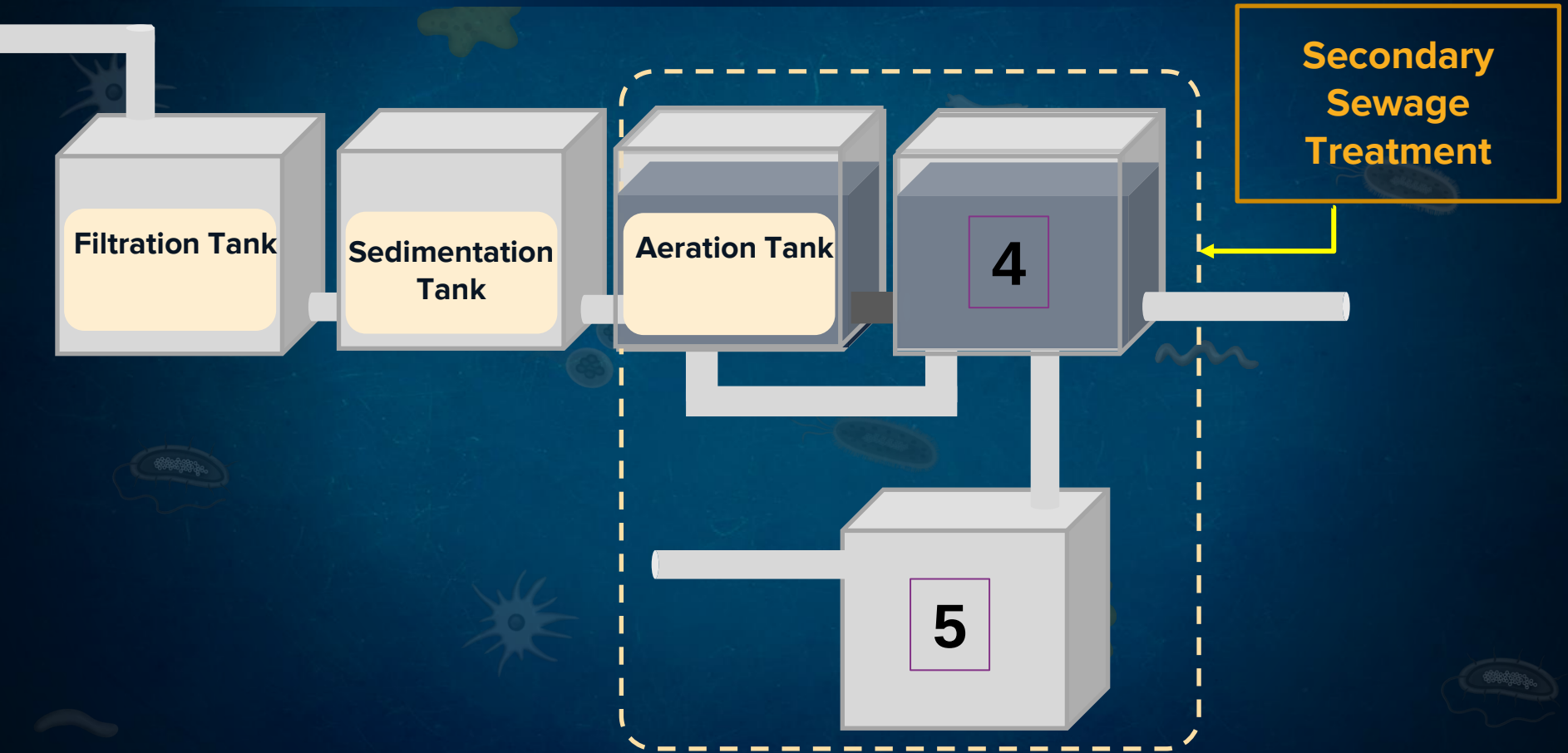
Secondary Sewage Treatment

Biochemical Oxygen Demand (BOD) is indirectly measure of the organic matter present in the water

- Greater the BOD of waste water higher the amount of organic matter greater the polluting potential of water

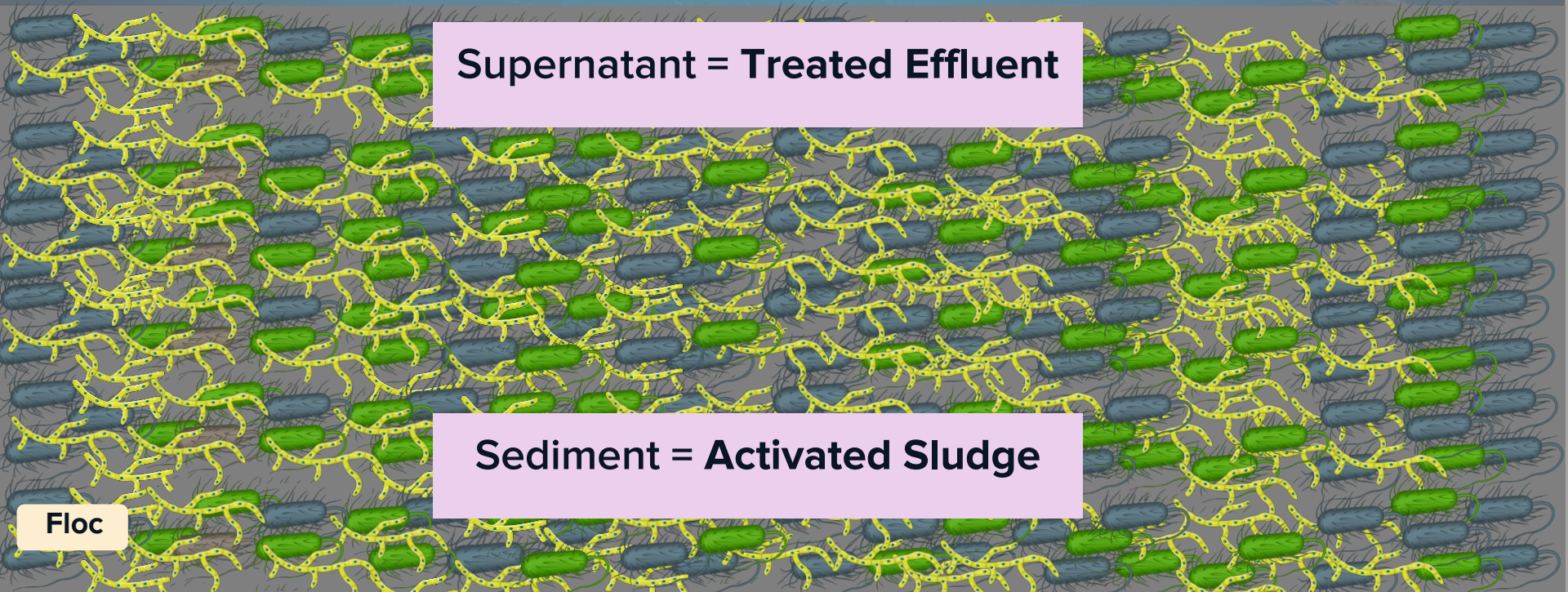
- Sewage water is treated till the BOD is reduced

Sewage Treatment Plant



Secondary Sewage Treatment

Settling Tank



Supernatant = **Treated Effluent**

Sediment = **Activated Sludge**

Floc

Secondary Sewage Treatment

Settling Tank

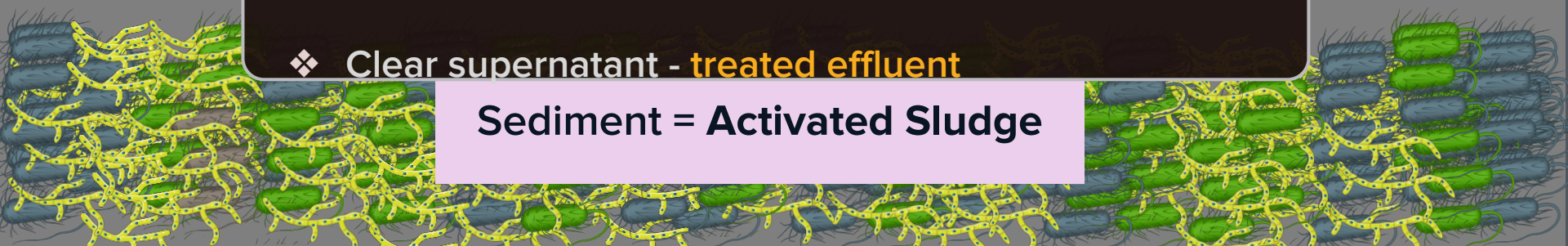
Settling Tank

Supernatant = Treated Effluent

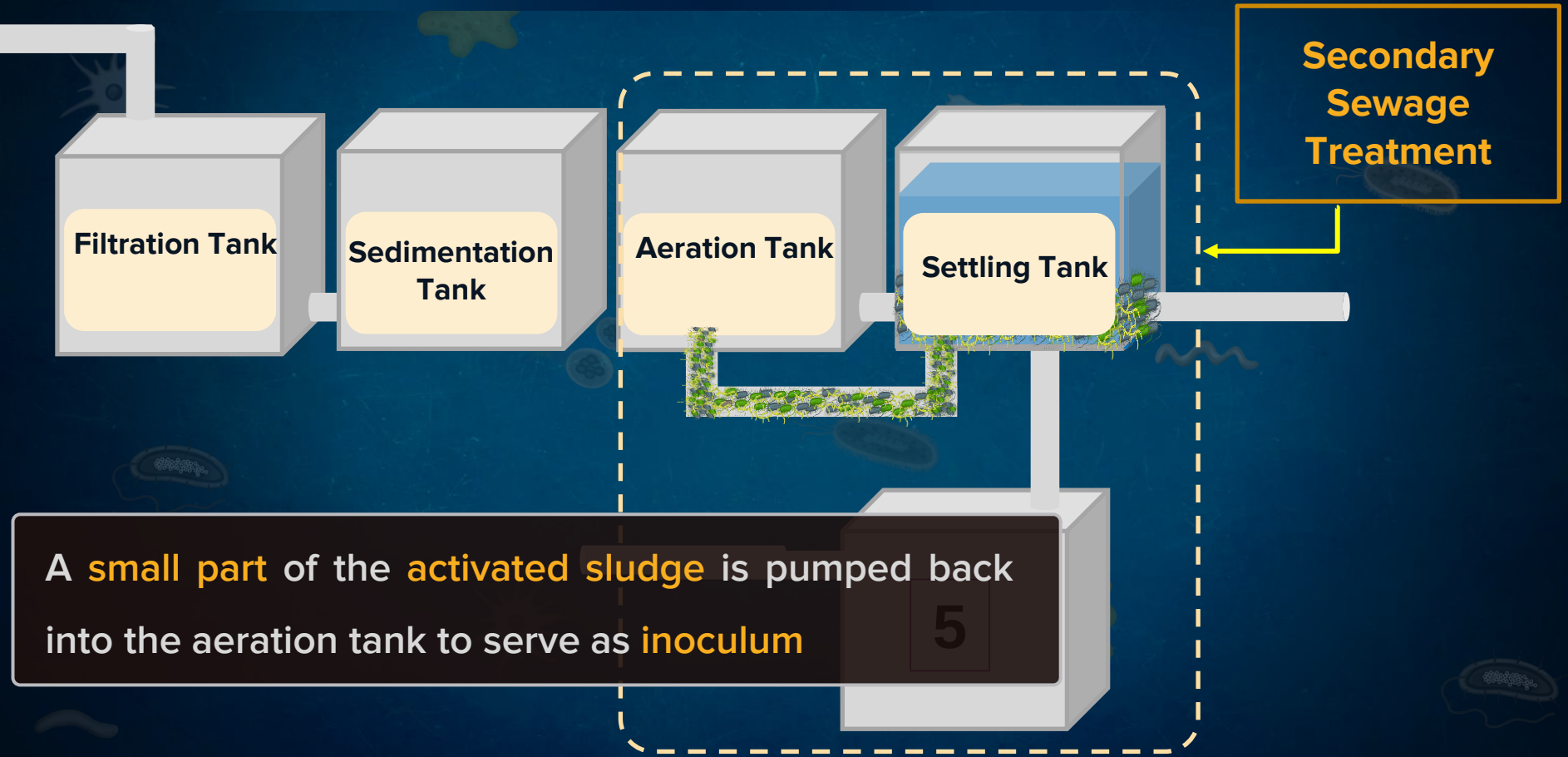
- Floc containing heterotrophic aerobic microbes and fungal filaments settles at the bottom- activated sludge

- Clear supernatant - treated effluent

Sediment = **Activated Sludge**

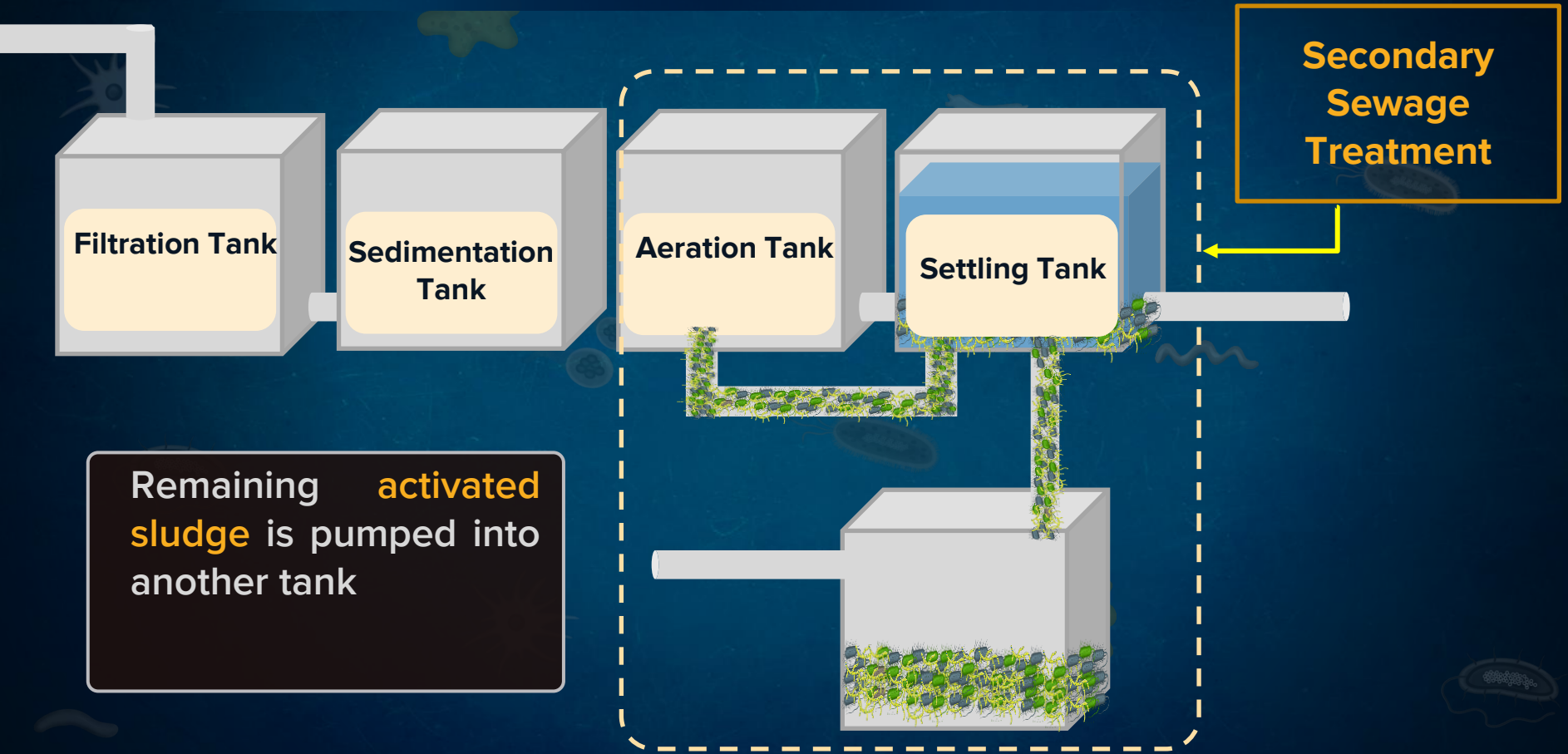


Sewage Treatment Plant



A small part of the activated sludge is pumped back into the aeration tank to serve as inoculum

Sewage Treatment Plant

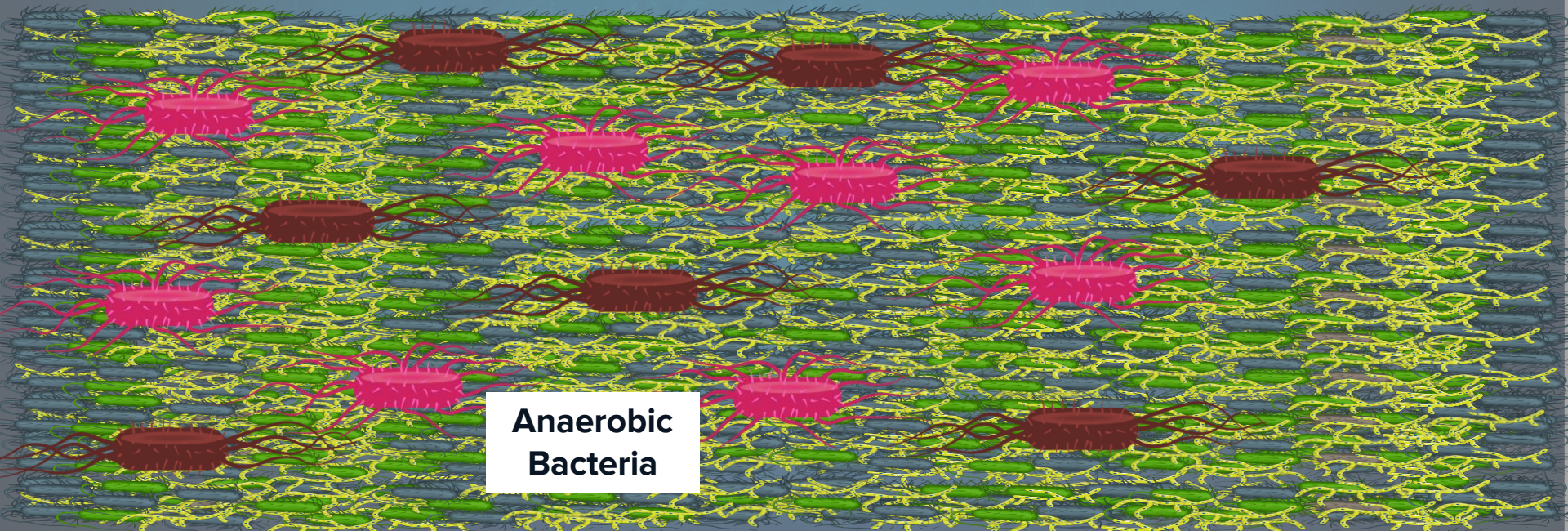


Remaining activated sludge is pumped into another tank

Secondary Sewage Treatment

Anaerobic Sludge Digester Tank

No Oxygen



Secondary Sewage Treatment

Anaerobic Sludge Digester Tank

No Oxygen

Methane

Carbon Dioxide

Hydrogen Sulphide

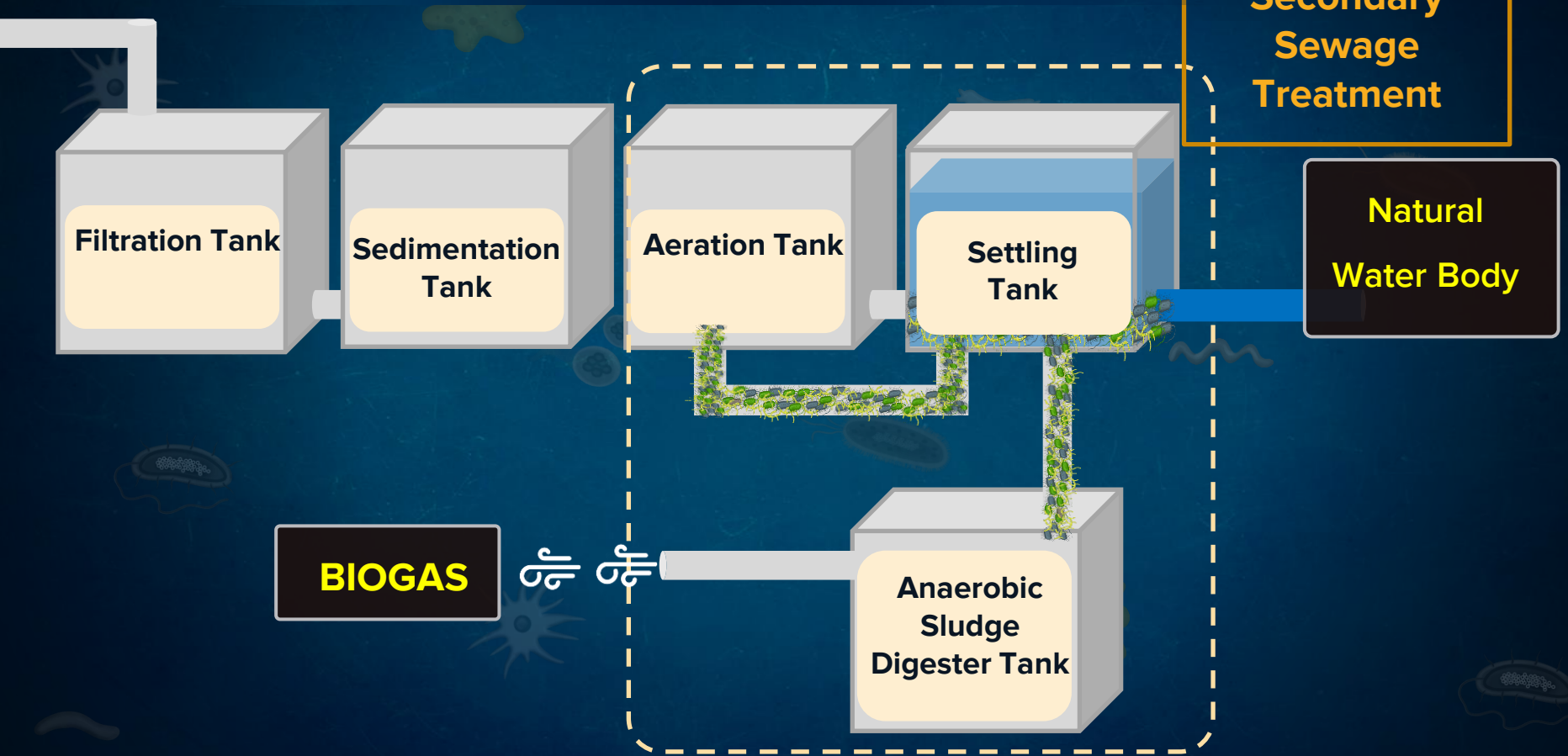
Secondary Sewage Treatment

No Oxygen

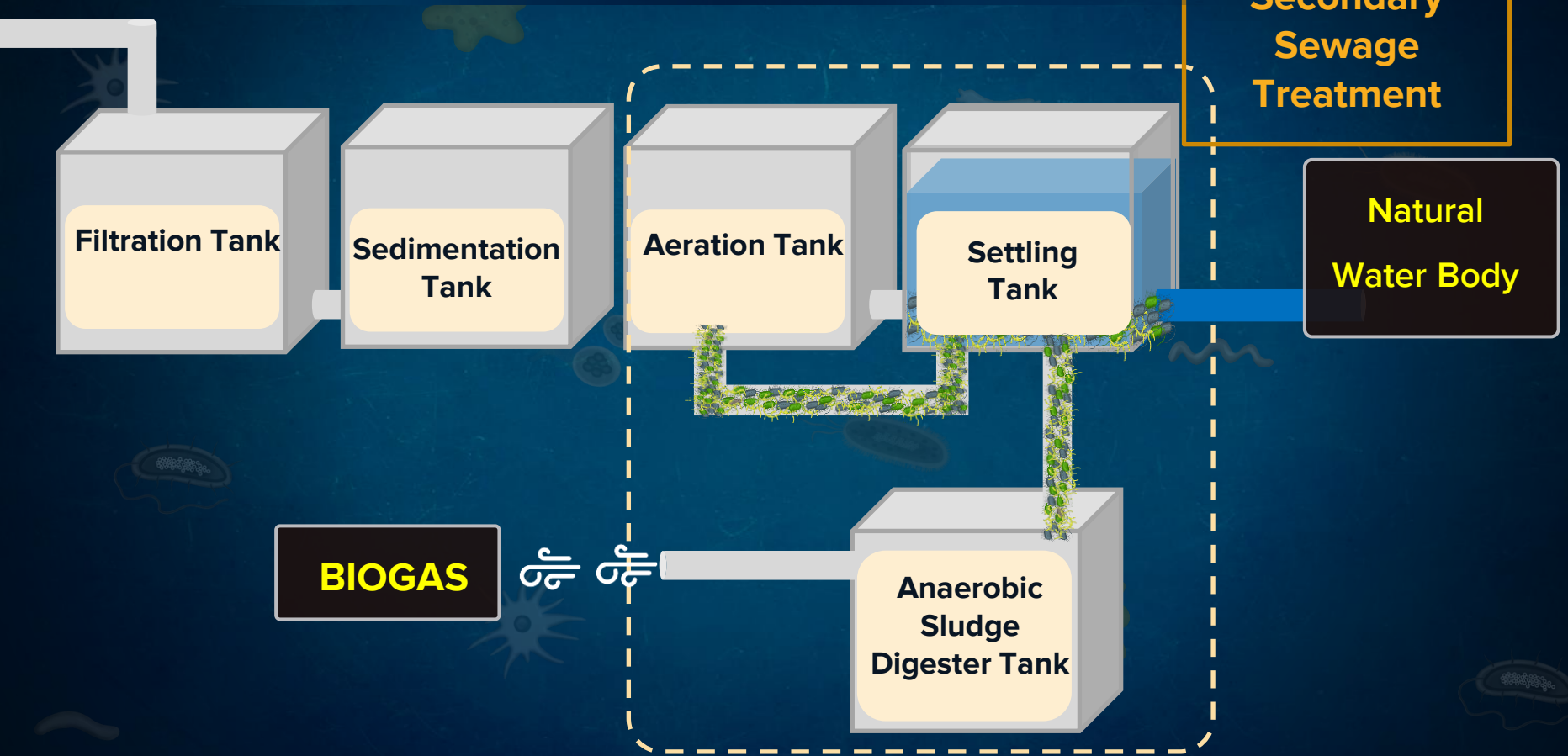
Anaerobic Sludge Digester Tank

- Anaerobic bacteria digest the activated sludge
- Release gases like methane, carbon dioxide and hydrogen sulphide
- Biogas – source of energy

Sewage Treatment Plant



Sewage Treatment Plant



How is government

handling this issue?

Plan Of Action

Save Major Rivers

Ministry Of Environment and Forests initiated:

- Ganga Action Plant
- Yamuna Action Plant

Plan Of Action

Save Major Rivers

- Build Sewage Treatment Plants in large numbers
- No untreated sewage must enter the major rivers


Keep Learning