KAMIL JANIAK

WHY DO WE TREAT WASTEWATER?

Wastewater Treatment Technology- course
Faculty of Environmental Engineering, Wroclaw University of Science and Technology

WROCŁAW, 2025

Plan

1. Organic compounds
2. Eutrophication
3. Control questions

Organic compounds

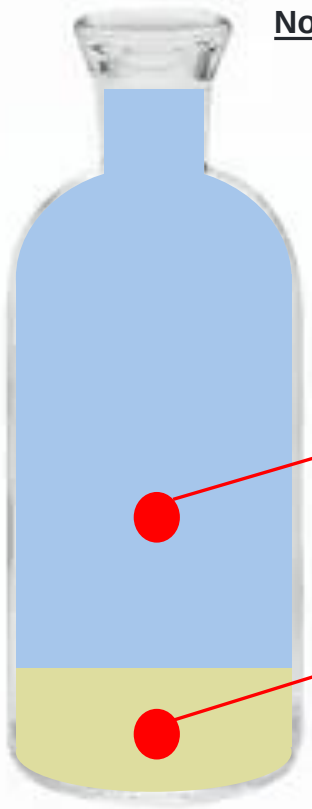
How do we define organic compounds in wastewater treatment technology?

The content of organic compounds is defined by the amount of oxygen required for their oxidation to CO_2 and H_2O.

This means that the content of organic compounds is not defined directly.

How do we define organic compounds in wastewater treatment technology?

BOD_5



No free space

Dilution water
- Contains oxygen
- Contains microorganisms
- Contains microelements

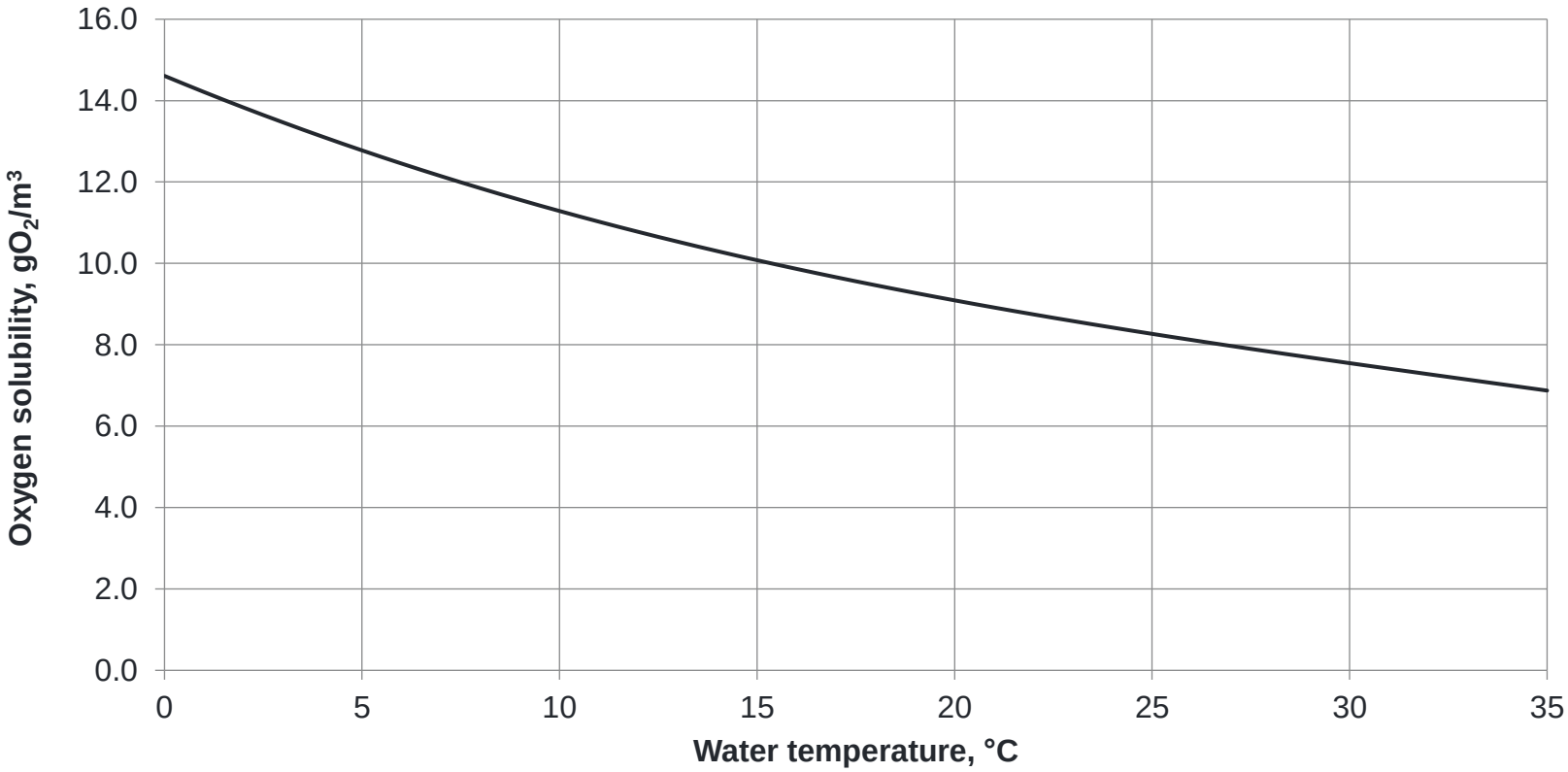
Wastewater
- Usually small amount

Sample stored in darkness

Mixed in such proportions so there is enough oxygen for 5 days of incubation

Zobacz również https://www.youtube.com/watch?v=v33CgWJ2TZ0

Oxygen solubility



How do we define organic compounds in wastewater treatment technology?

BOD_5

BOD_5 of a sample is the difference between the initial and final oxygen concentration, multiplied by the dilution factor.

Example:

Dilution 1:100
Initial O_2 concentration = 8 g O_2/m^3
Final O_2 concentration = 2 g O_2/m^3
BOD_5 = (8-2) * 100 = 600 g O_2/m^3

BOD_5 is a measure of the concentration of biodegradable organic compounds in wastewater.

How do we define organic compounds in wastewater treatment technology?

COD

COD is a measure of the total content of organic compounds in wastewater (both biodegradable and non-biodegradable).

Mechanism

Biogens

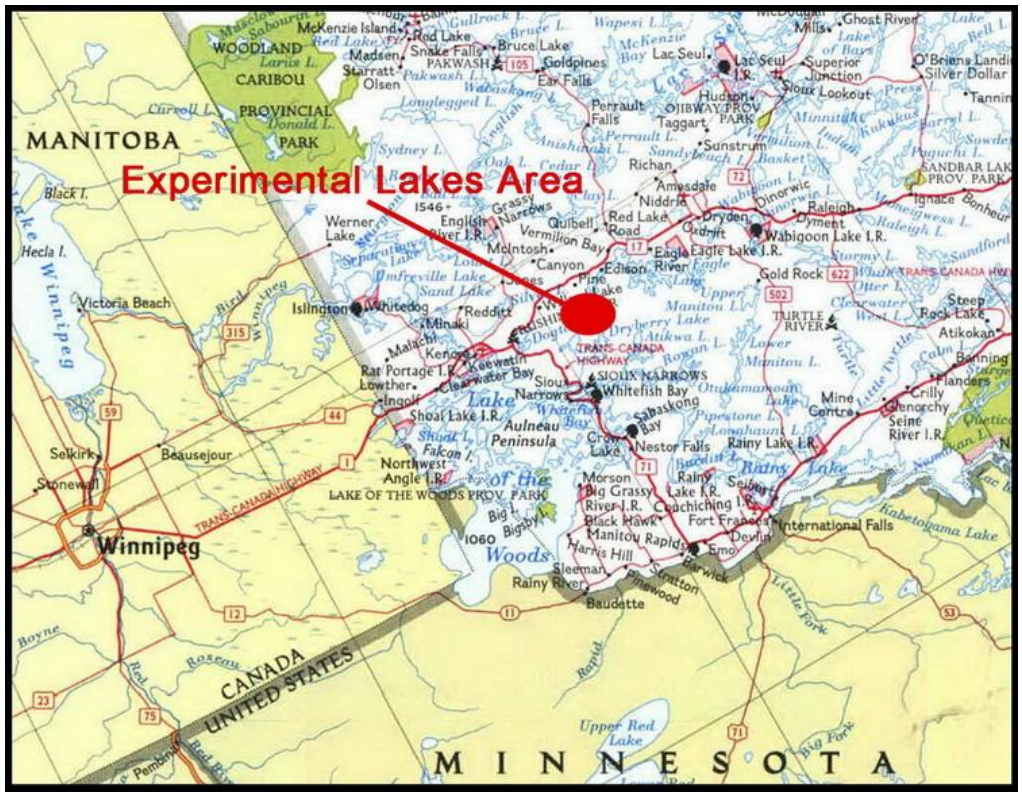
Biogens

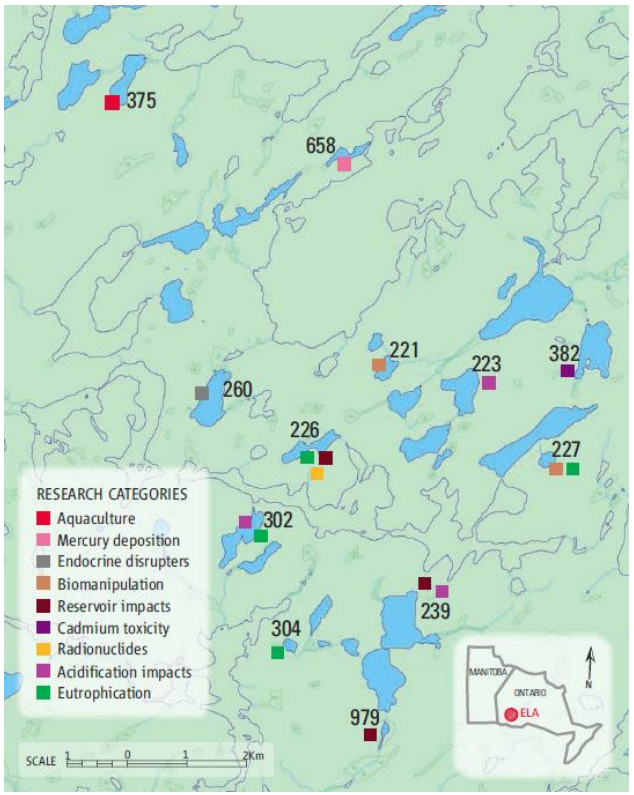
Eutrophication

Mechanism

Nitrogen or phosphorus – which one is more important?

Canada experience (experimental lakes area)





The removal of phosphorus is more important

Control questions

1. How does nitrogen discharge in wastewater contribute to the degradation of the aquatic environment?
2. How does phosphorus discharge in wastewater contribute to the degradation of the aquatic environment?
3. Organic compounds – what happens when they enter the environment from wastewater?
4. Why is phosphorus the key element limiting algae growth?
5. What nitrogen removal mechanisms occur in natural waters? Do they allow for effective water purification from nitrogen compounds?
6. What phosphorus removal mechanisms occur in natural waters? Do they allow for effective water purification from phosphorus compounds?
7. Prepare schematic drawings illustrating the effects of water pollution by wastewater.
8. Explain the procedure for determining BOD_5. What is the physical significance of the obtained result?
9. Oxygen solubility – how much oxygen dissolves in 1 m^3 of water? Is this amount sufficient in relation to the oxygen demand required for the oxidation of organic compounds in wastewater?