

Ministry of Education and Science of the Russian Federation
Novosibirsk State University of Architecture and Civil Engineering (SIBSTRIN)



The Chair of water supply and sanitation;
The Chair “Theory and Technology of Environmental Safety and
Water Resource Control”

Project: “Development of wastewater treatment technology for the factory in Myanmar”

Fulfilled by a master student A. Semenova (231 a –mag)
The supervisor associate professor G. T. Ambrosova



Goal:

Development of wastewater treatment technology for wastewater reuse in the circulating system

Objectives:

1. Review of literature on the selected topic;
2. Development of an experimental setup;
3. Investigation of the effects of specific nutrient substrate on the biocenosis of activated sludge;
4. Technical and economical comparison;
5. Development of recommendations for the technology.



INDIA

INDIA

BANGLADESH

CHINA

Myitkyina

Mandalay

Taunggyi

Pakokku

Sittwe

LAOS

Toungoo

Henzada

Pegu

Bassein

THAILAND

Moulmein

RANGOON

Tavoy

Mergui

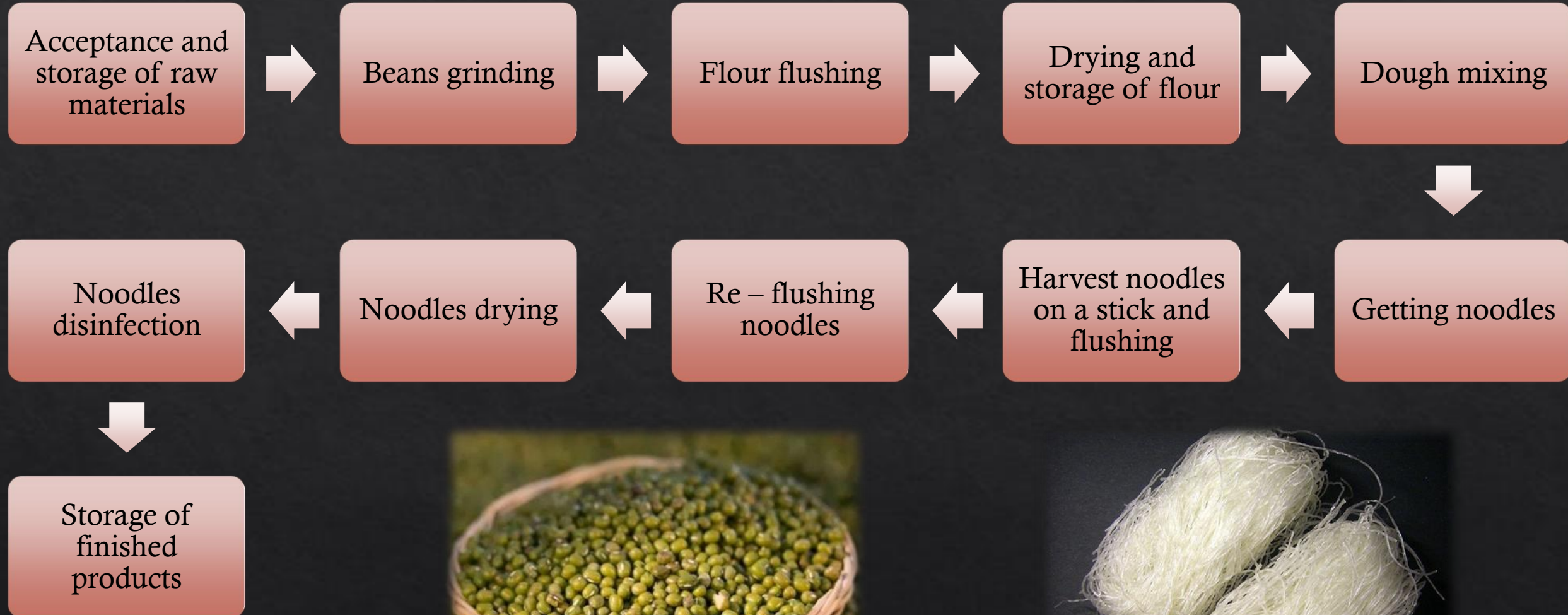
South China Sea

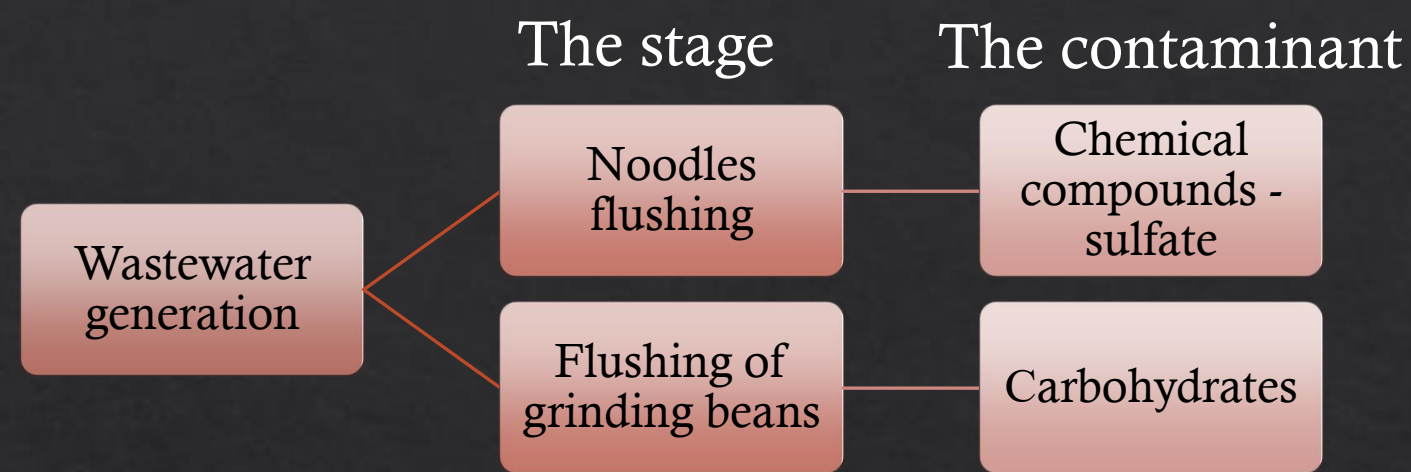
Bay of Bengal

Andaman Sea

0 200 km
0 200 miles

Technological process





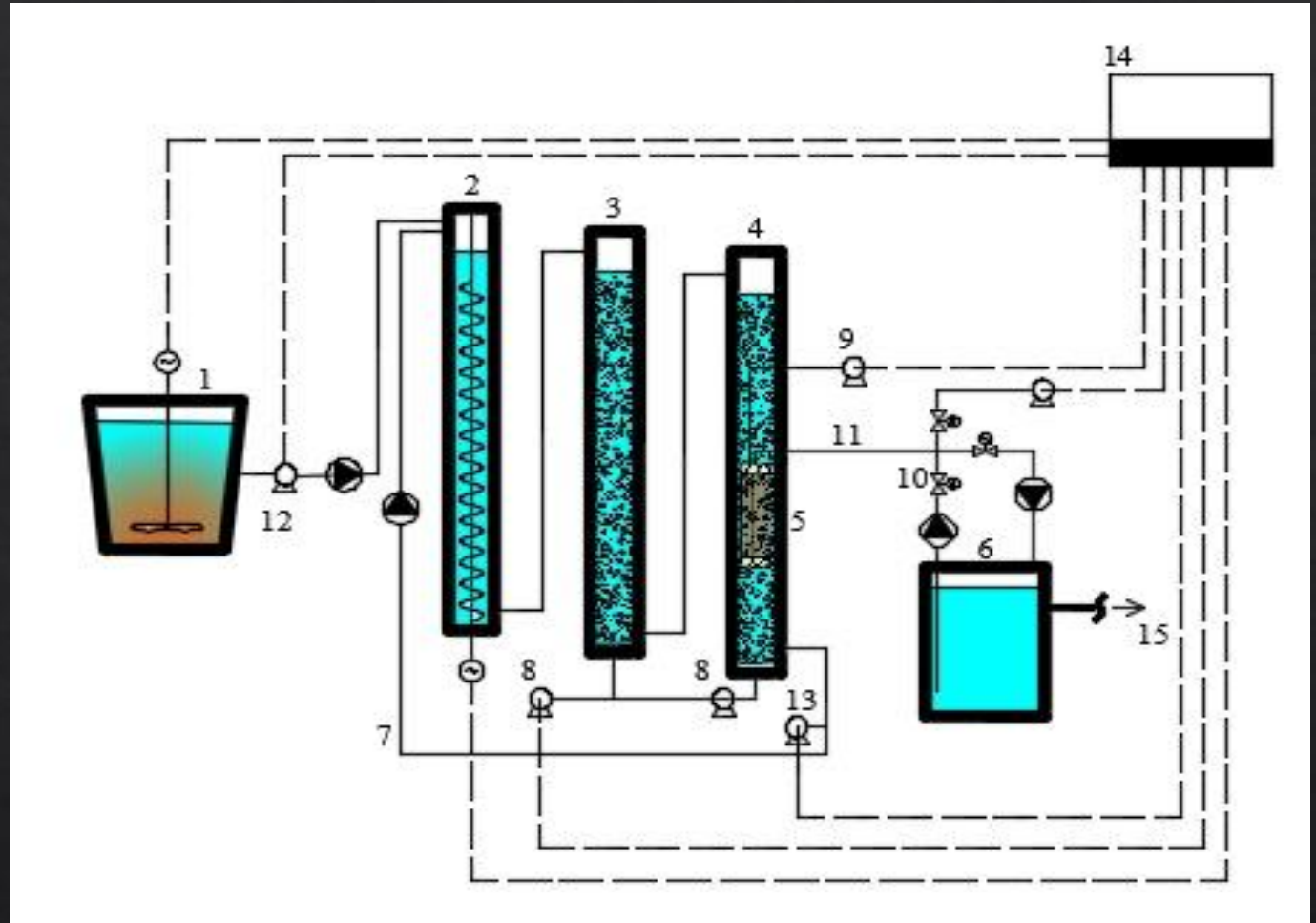
The results of wastewater analysis from the factory

Indicators	Value, mg/l
COD	3983-4070
Ammonium nitrogen	6-8
Phosphorus	60-70
Chlorides	3300-3600
Sulfates	350-374
pH	6 ед.

Maximum permissible concentrations of chemical elements in pure water

Indicators	Value, mg/l
COD	No more than 30
Ammonium nitrogen	1,5
Phosphorus	0,2
Chlorides	250
Sulfates	350
pH	6,5-8,5 ед.

Experimental setup



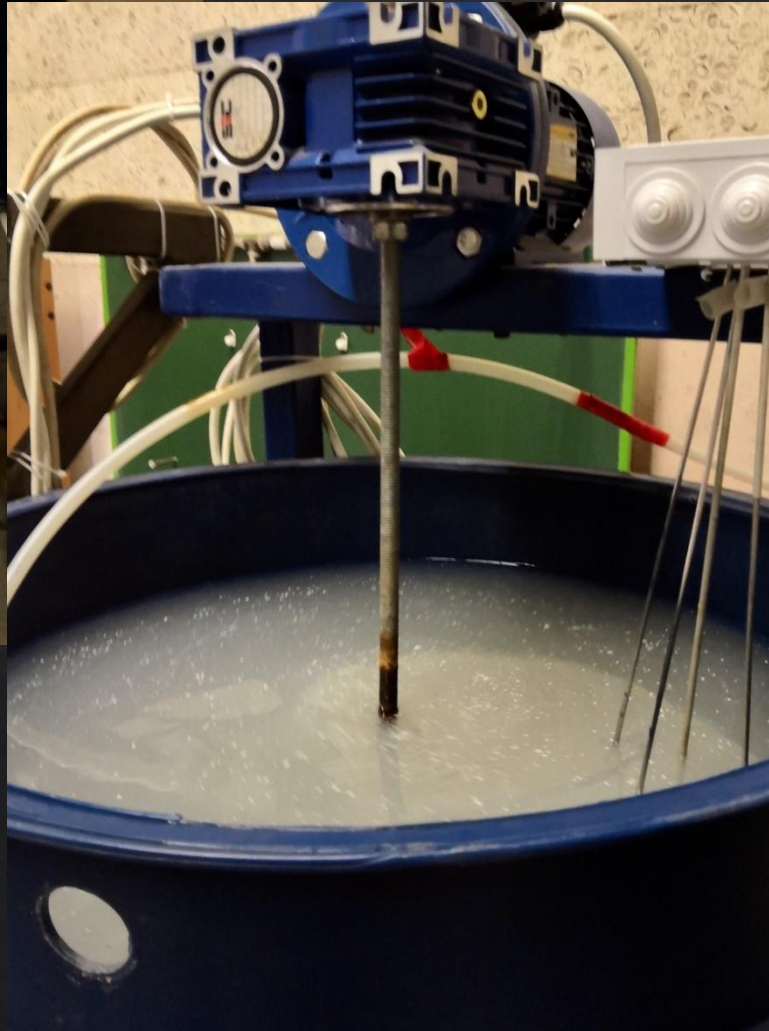
1 - regulator tank; 2 - denitrifier; 3 - aerotank; 4 - nitrifying; 5 - membrane module; 6 - storage tank; 7 - circulation line; 8 - compressors; 9 - blower for regeneration of the membrane module; 10 - washing line; 11 - permeate line; 12 - feed pump; 13 - circulation pump; 14 - automatic control unit; 15 - release.

Artificial wastewater

The waste liquid had the following characteristics:

- suspended substances - 660 mg / l;
- BOD complete - 700 mg / l;
- ammonium nitrogen - 70 mg / l;
- phosphorus - 30 mg / l;
- pH from 7.2 units;
- temperature - 21-22oS.
- pH от 7,2 ед;
- температура – 21-22oC.

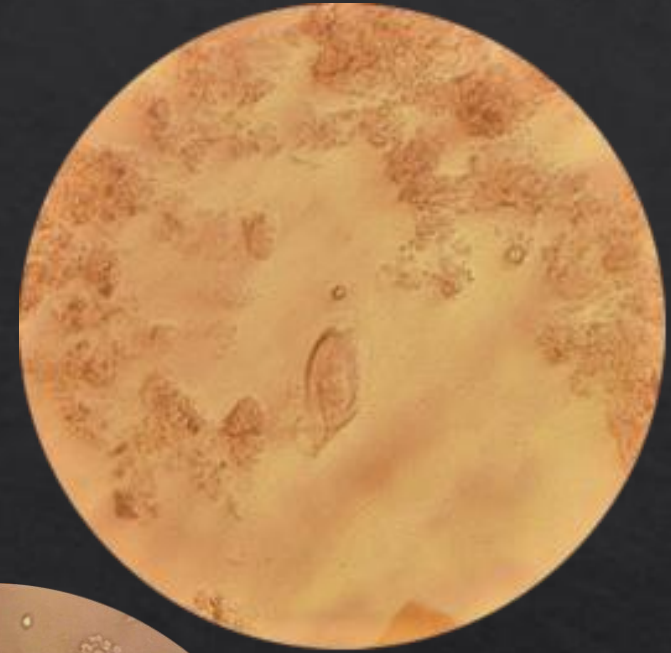
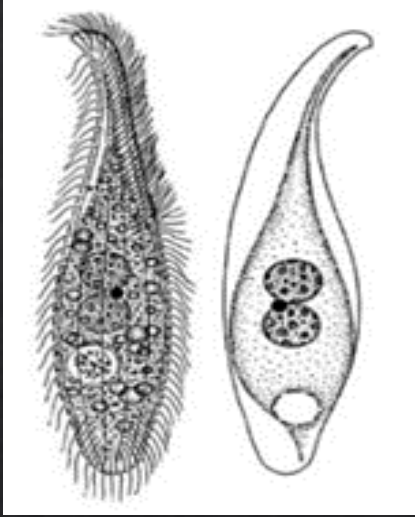
Based on these data, the artificial waste liquid were made with gray bread, ammonium nitrogen - ammonia ammonium 25%, phosphates - orthophosphoric acid 75%, carbohydrates - light beer, milk, apple vinegar and starch



Hydrobiological analysis

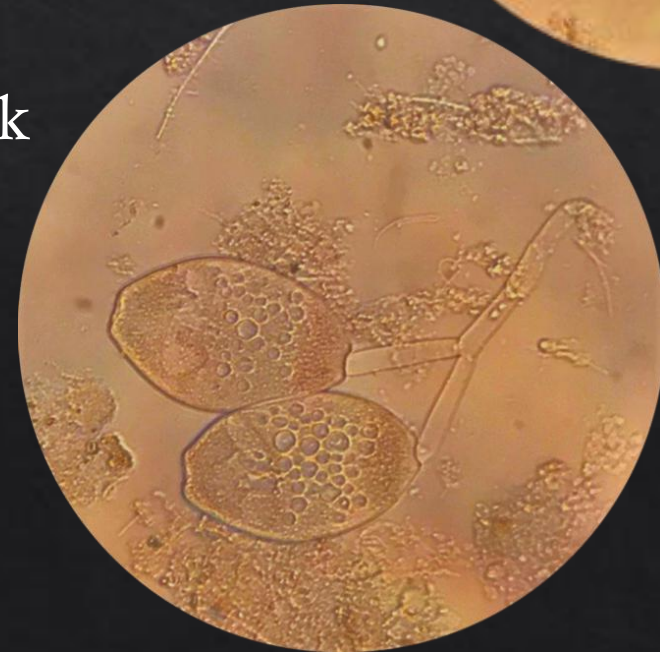
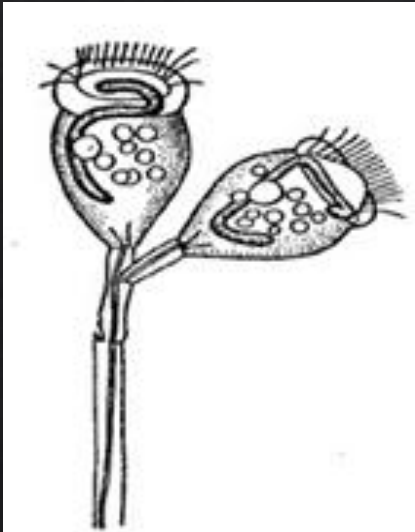
a) *Litonatus lamella* 1st week

Occurs with increased load and disturbances of the cleaning process, tolerates low oxygen content, predator

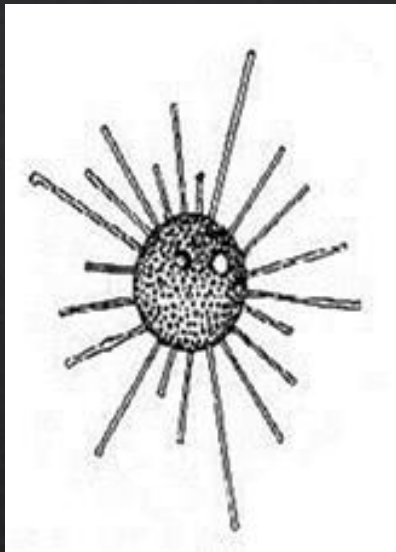


b) *Carchesium polypinum* 2nd week

Typical for activated sludge under heavy load. present in normally operating aeration tanks

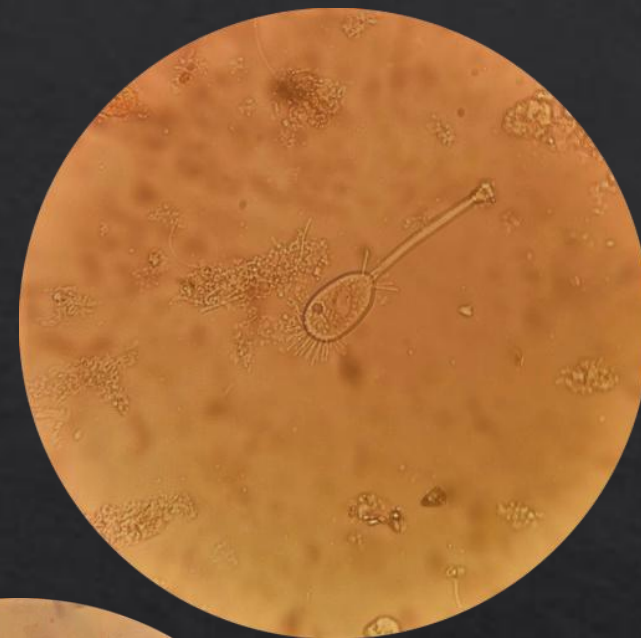


Hydrobiological analysis



в) *Padaphrya carchesii* 3d week

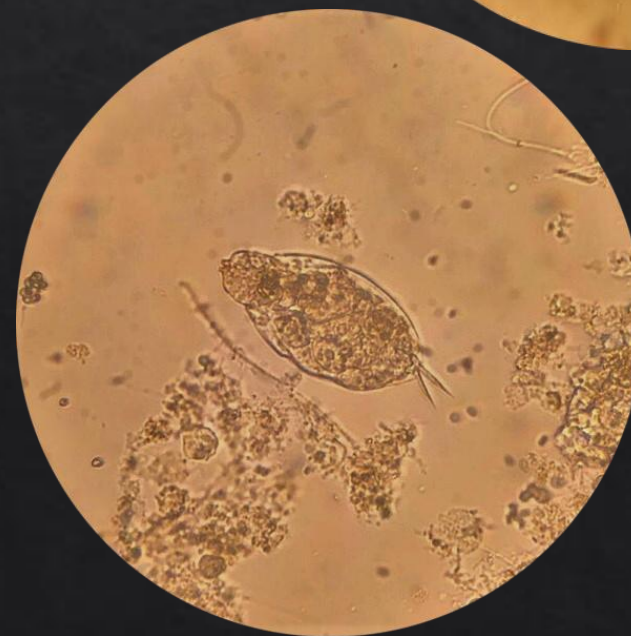
They develop in small quantities with the complete oxidation of pollutants and stabilization of the wastewater treatment process, they are indicators of high quality.



г) *Cathypna luna* 4th week

Characterize

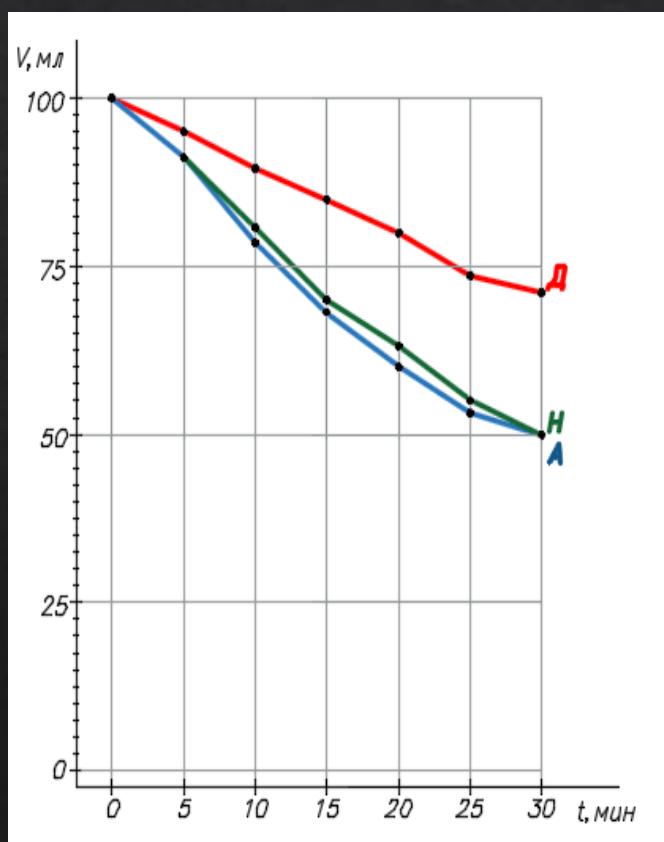
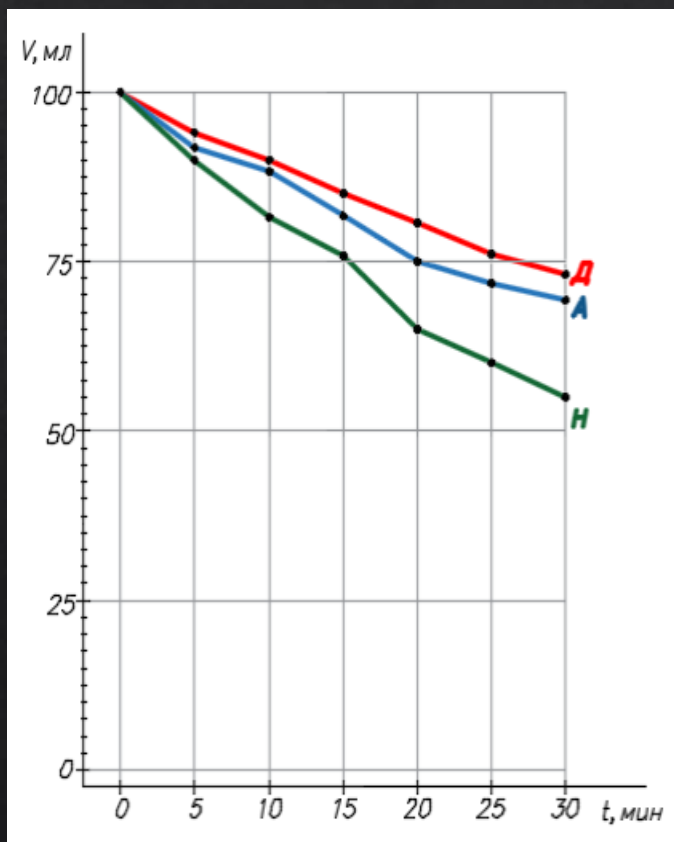
- high quality purification,
- good nitrification process,
- satisfactory mineralization of sludge



Sludge mixture indicators

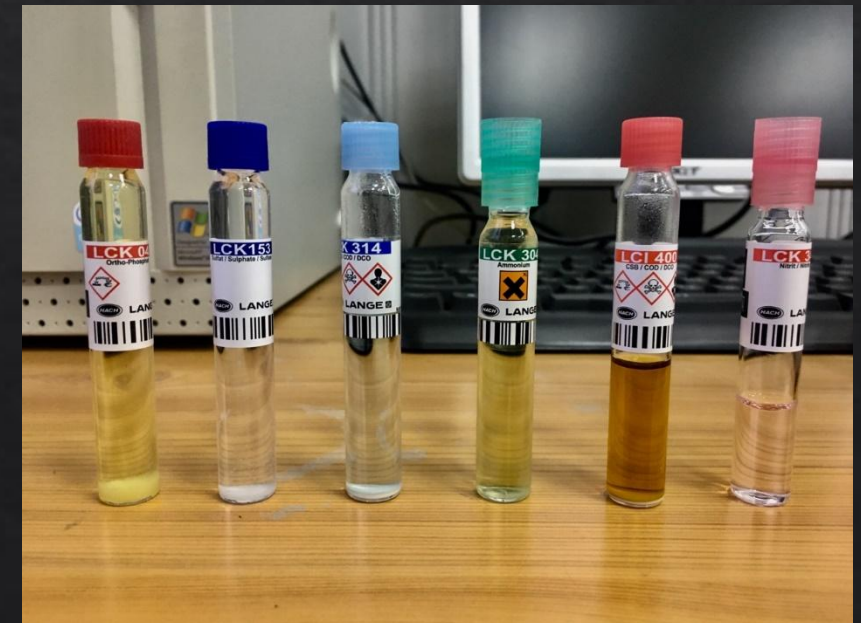
The graphs of sedimentation

Zone	Sludge volume, ml	Dose of sludge, g	Sludge index, 1/g
Denitrification	520	3	173,34
Aeration	410	2	205
Nitrification	400	2	200



Analyzes of wastewater from each zone

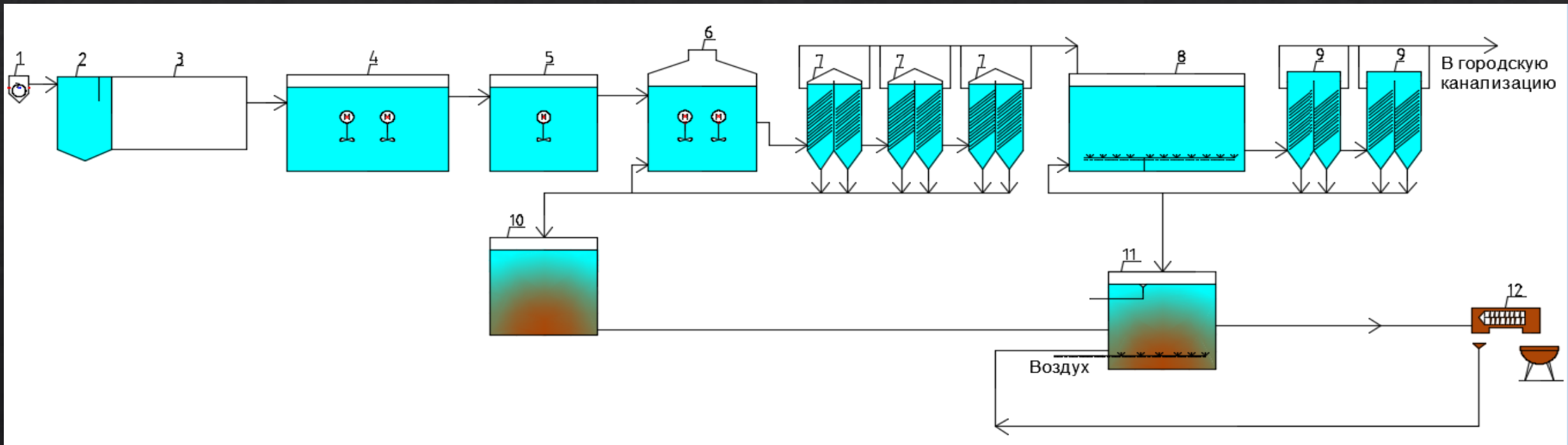
№	Indicators	Value, mg/l		
		Den	Aer	Nitrif
1	COD	89,3	86,9	83,4
2	Ammonium nitrogen	0,88	0,66	0,38
3	Nitrites	0,25	0,26	0,28
4	Nitrates	1,09	1,64	1,72
5	Sulfate	0	0	0
6	Chlorides	34,7	37,4	29,4
7	Phosphorus	7,43	7,3	5,78
8	pH	8,3	8,37	8,36



Moscow-Efes is a brewing company that is one of the four largest players in the Russian market, a division of the international brewing company Anadolu Efes.

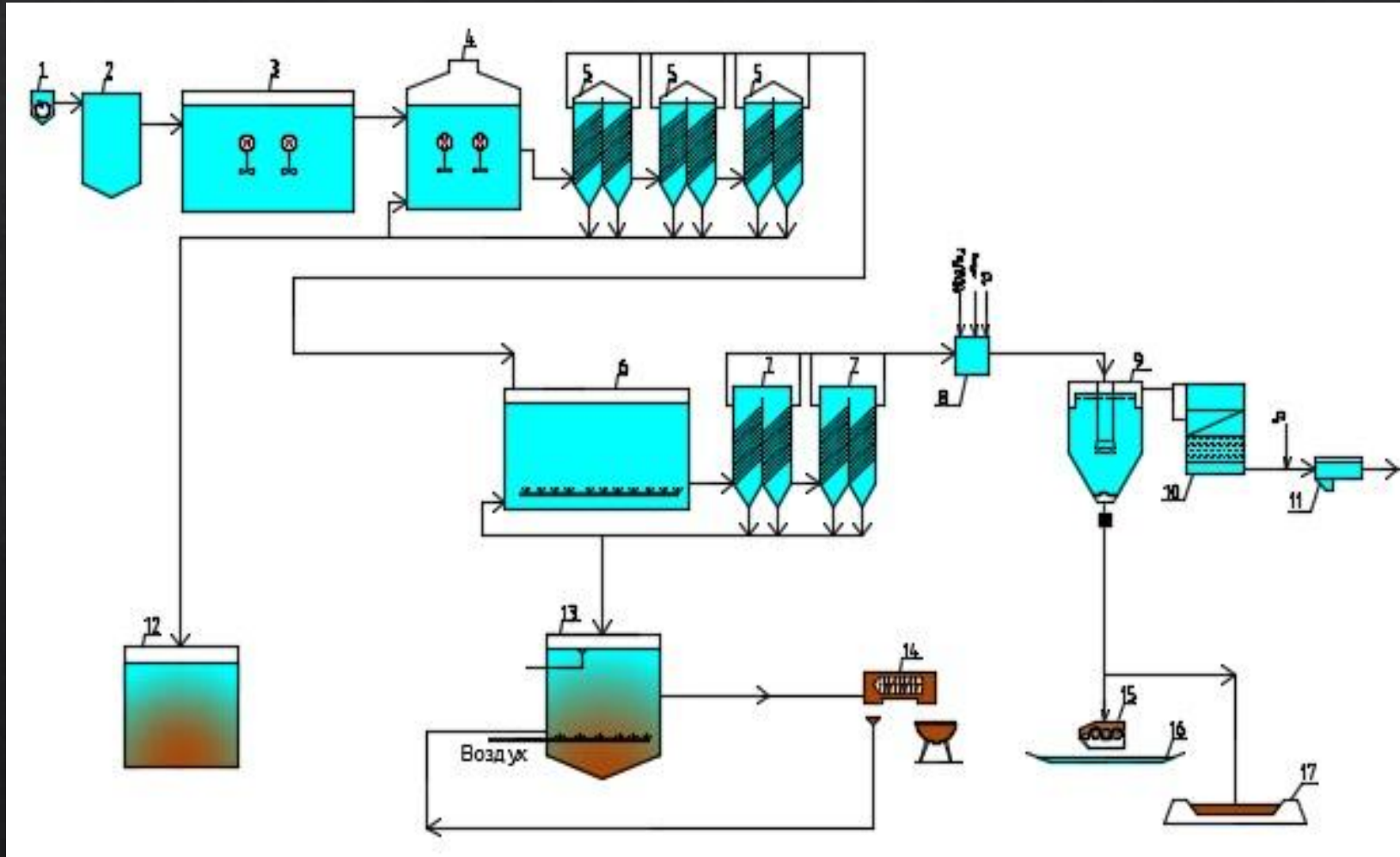
ANADOLU EFES

Technology scheme



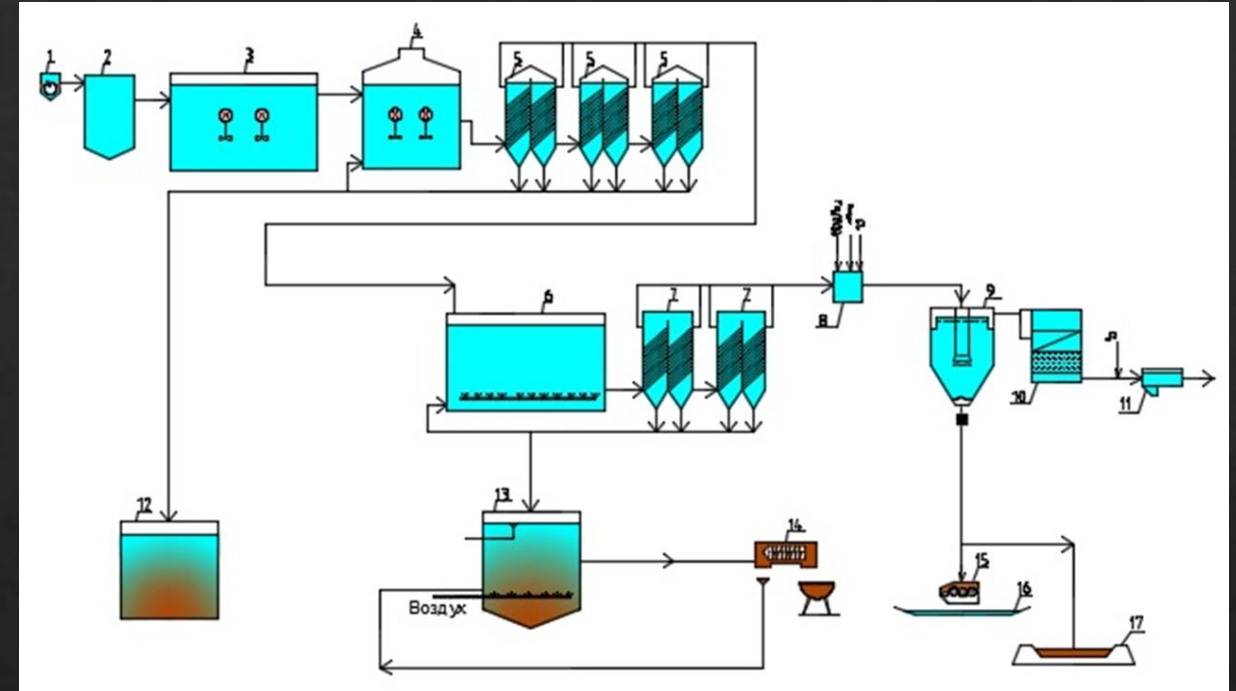
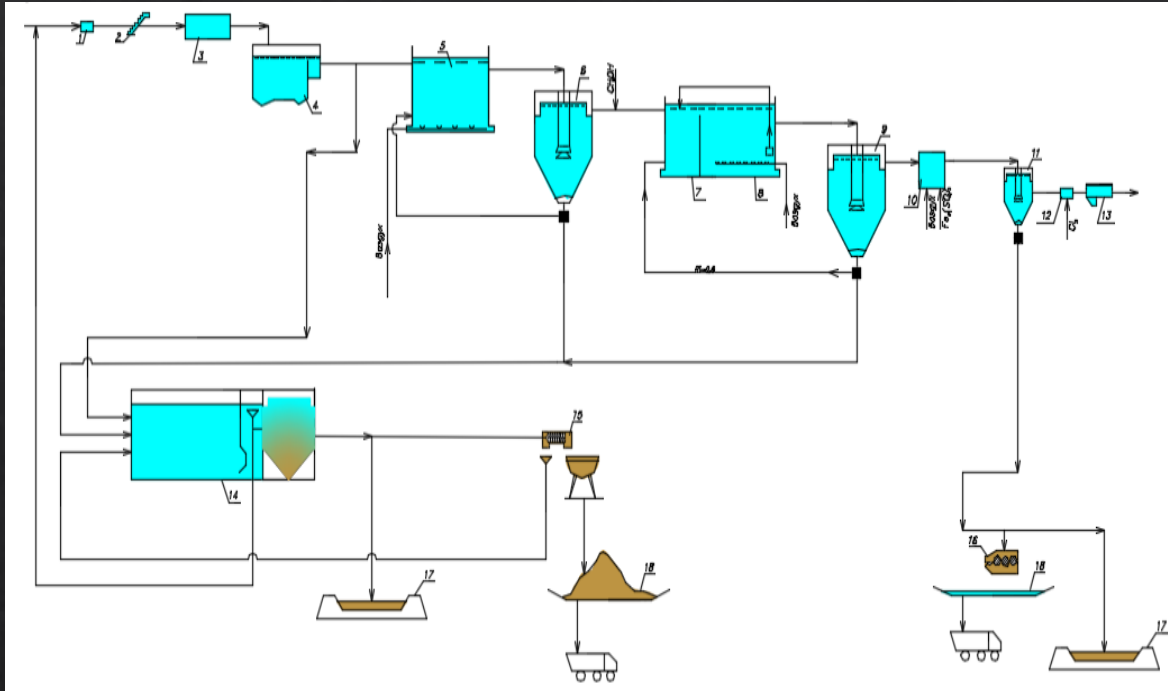
1 – channel sieve; 2 – sand trap; 3 – pump pit; 4 – equalization basin; 5 – neutralization basin; 6 – methane reactor; 7 – lamella separator anaerobe; 8 – biological reactor ; 9 – lamella separator aerobe; 10 – pellet sludge tank; 11 – sludge digester; 12 – dekanter.

The proposed scheme for the factory of funchoza



- 1 - auger sieve;
- 2 - sand trap;
- 3 - reservoir-averager;
- 4 - aerobic bioreactor;
- 5 - anaerobic thin layer settler;
- 6 - aerotank;
- 7 - aerobic thin-bed settler;
- 8 - bioreactor;
- 9 - physico - chemical sedimentation tank;
- 10 - filter;
- 11 - clean water tank;
- 12 - collection of sludge;
- 13 - silt sealer;
- 14 - centrifuge;
- 15 - filter press for a crystalline precipitate;
- 16 - collection of filtrate;
- 17 - collection of sludge;

Technical and economical comparison



Construction cost

1 scheme	2 scheme
154 340 592,12 ₺	145 371 081,72 ₺