ZEOLOGIC

SUBSIDIARY OF **MYTILINEOS**

Municipal Wastewater Treatment

Design, construction, installation and maintenance of waste treatment plants

Approach

The power of nanotechnology in environmental protection

The volume of wastewater continues to increase as a result of changing demographics, economic development and urban spread. Along with more stringent environmental safeguarding as a result of regulations and lifestyles, wastewater treatment is a major environmental challenge for local authorities.

Municipal Wastewater treatment is a technological and economic challenge; the goal is to preserve biodiversity and protect water resources while ensuring the wellbeing of local populations. Unfortunately, inadequate standards and a lack of monitoring and regulations have led to ineffective wastewater treatment all over the world.

Poorly functioning or non-functioning wastewater treatment plants cause pollution of coastal waters, damage fragile coastal resources such as coral reefs and endanger the health and safety of the region's inhabitants and visitors. Wastewater also contains nutrients, which can stimulate the growth of aquatic plants and algae. This reduces the clarity of the water, limits oxygen which threatens marine life, and causes once healthy reefs to be covered with seaweed and algae.

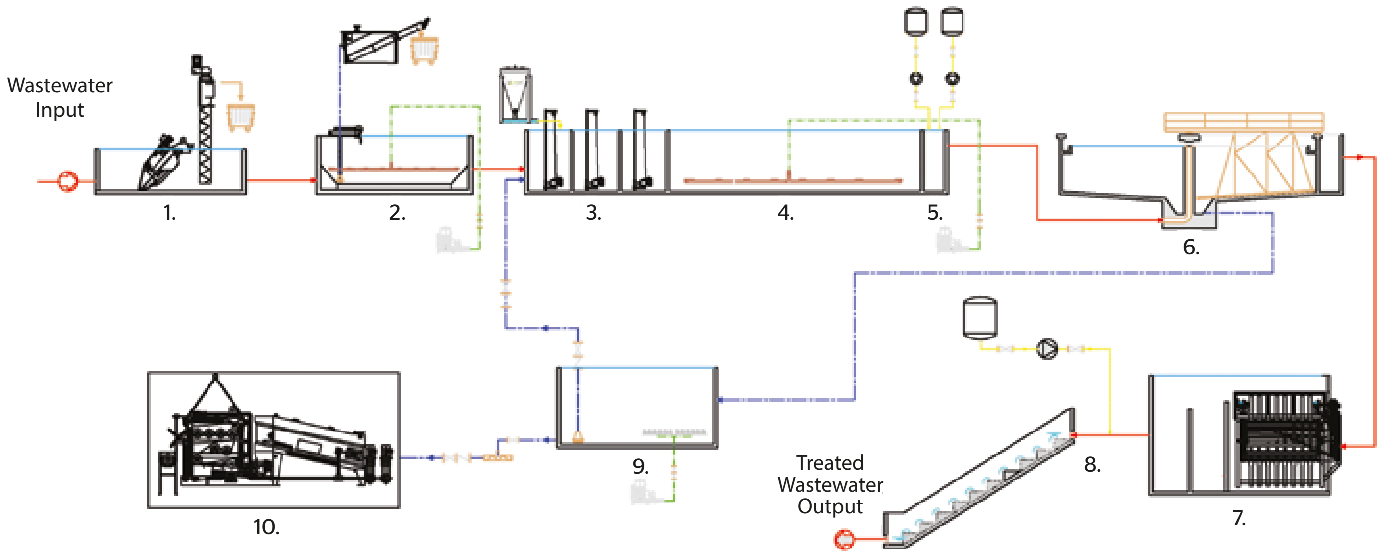
Through innovative technologies, high-quality EPC and O&M services, ZEOLOGIC provides an innovative and effective treatment for municipal wastewater treatment.

Parameter	Unit	Initial Value	Final Value	Typical Limits
Colour	Units Pt/Co	636	40	50
pH	Units pH	8.24	7.68	6.0 – 8.5
Conductance	μS/cm at 20°C	1,210	1,096	1,200
Suspended Solids (SS)	mg/L	312	17	35
Nickel (Ni)	mg/L	0.42	0.08	0.4
C.O.D.	mg/L	836	36	125
B.O.D.5	mg/L	348	11	25
Dissolved Oxygen (D.O.)	mg/L	1.42	>4	>3.0
Trivalent Chromium (Cr + 3)	mg/L	0.12	0.08	1.2
Hexavalent Chromium (Cr + 6)	mg/L	0.04	0.01	0.3
Copper (Cu)	mg/L	0.89	0.14	0.5
Total Iron (Fe total)	mg/L	3.26	0.37	15
Zinc (Zn)	mg/L	2.24	0.53	5.0
Manganese (Mn)	mg/L	0.35	0.04	1.5
Free Chlorine (Cl)	mg/L	<0.05	<0.05	0.5
Fluoride (F-)	mg/L	6.26	1.21	8.0
Sulfur (SO3-2)	mg/L	<0.1	<0.1	0.7
Sulfur (S-2)	mg/L	0.59	0.16	0.7
Total Nitrogen (TN)	mg/L	125.69	9.36	15
Total Phosphorus (P total)	mg/L	40	0.49	1.0

Table 1: Chemical analysis of a typical Municipal Wastewater sample before and after treatment with ZEOLOGIC GACS method.

Technical Characteristics

Technical Description of a typical Municipal Wastewater treatment unit using the Geochemical Active Clay Sediment method (GACS):



Legend:

Wastewater Line:
Air Line:
Consumable Line:
Sludge Line:

Municipal Wastewater Treatment plant using GACS including the following stages:

1. Screening
2. Sand & Grease Removal
3. Main Geochemical Treatment
4. Chemical Oxidation
5. Coagulation - Flocculation
6. Settling
7. Tertiary Filtration
8. Chlorination
9. Sludge Thickening
10. Sludge Dewatering

1. Screening: Screening is necessary for removing any big size solids like rocks, woods, and metal fragments before the wastewater enters the main treatment installation, avoiding obstructions and mechanical problems in the plant. Usually screens are stand-alone units with self-cleaning systems and automatic drive operation.

2. Sand and Grease Removal: In this stage, the remaining sand and other small solid particles are removed in order not to damage the mechanical equipment of the plant. Simultaneously grease removal is taking place, as municipal wastewater has a concentration of grease that can damage E/M equipment by its accumulation in pumps and pipes. The removal of fine solids & grease is taking place by physical separation based on their different specific weight. Air usage is helping separation & increases efficiency.

3. Main Geochemical Treatment: Wastewater flows from Sand and Grease removal stage into the Main Geochemical treatment tank. Continuous stirring homogenizes the mixture. Automated dosing systems are used to add the geopolymer material and inert sludge recirculates to speed up the process and eliminate odors.

4. Chemical Oxidation: Wastewater flows into the Chemical Oxidation. Blowers with diffusers are used to ensure the proper aeration of the wastewater. Aeration's system operation is automatic and controlled by DO meters. Aeration provides the necessary oxygen for the oxidation of the wastewater and helps the proper homogenization.

5. Coagulation - Flocculation: Afterwards, the wastewater flows into the coagulation-flocculation tank. At first, wastewater flows into the coagulation tank. In this tank coagulant is added with a dosing system and there is also a stirring system to achieve the proper homogenization. Next, the wastewater flows to the flocculation tank, where flocculant is added, and the wastewater is homogenized with a proper stirring system. The flocculant is prepared by an automated self-assembled polyelectrolyte system.

6. Settling: The incoming wastewater flows into the center of the tank to ensure smooth and steady flow. The clear water overflows into a collection channel. The bottom of the tank has gradient to the center in order the settling sludge to be collected into a central collection pipe. To transport the sludge more efficiently out of the tank, a scrapper is used, mounted with telescopic rods. The produced sludge goes to sludge thickening tank.

7. Tertiary Filtration: Treated water goes to a Mechanical Filtration stage with a fully automated prefabricated filter for the removal of any remaining suspended solids. Backwash discharges are automatically recycled in the sludge thickening tank.

8. Chlorination: After Mechanical Filtration, it is necessary to disinfect the treated wastewater. Usually a disinfection unit can be used to add NaClO depending on the installation requirements. Disinfection is required for eliminating pathogenic microorganisms before the disposal of the treated wastewater to the environment. After Chlorination, a system of concrete steps is commonly used to enrich the treated water with oxygen before its disposal. For this purpose, a cascading flow is implemented in order to mix oxygen with the treated wastewater.

9. Sludge Thickening: Sludge produced in the settling tank, and the tertiary filter, is pumped to the sludge thickening tank. This is a storage tank where the sludge can be pumped and recirculated back into the treatment line or can be extracted by sludge press.

10. Sludge Dewatering: Sludge Dewatering can be achieved either by using sludge beds, or decanter, or filter press, based on the sludge humidity and its volume. Dry sludge can be used as a soil improver.

- All of the stages described above are fully automated and controlled through a Programmable logic controller (PLC).
- On-site control and interference with the operation of the unit is done via a touchscreen HMI (Human-machine interface).
- Supervisory control and data collection is done through the SCADA system (Supervisory Control And Data Acquisition).
- Remote control and operation of the unit is possible. Wireless communication for remote control can be done via mobile phone, tablet and PC.

Contact information

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