

# ZEOLOGIC

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## **Industrial and Hazardous Wastewater Treatment**

Design, construction, installation and maintenance of waste treatment plants

Industrial and hazardous wastewater is a major source of aquatic environmental pollution and is produced by a large number of heavy industries like refineries, petrochemical industries, metallurgies, pharmaceutical industries etc or by economic sectors like shipping. In general, removal of pollutants in a wastewater is a requirement for the disposal of water and obtains to environmental standards. Industrial and hazardous wastewater often contains recalcitrant compounds and heavy metals and they are rich in organic pollutants and therefore has to be treated properly before its disposal. Industrial and hazardous wastewater can be dangerous for the environment and for the humans and its treatment must be carried out by special treatment processes, before it can be disposed safely.

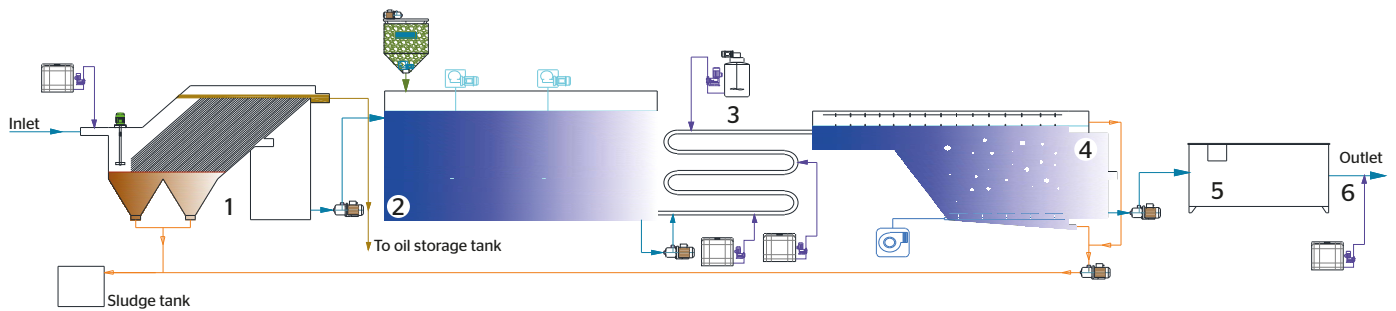
### **Technical Description of Industrial and Hazardous Geochemical Wastewater Treatment Plant**

The main stages of the Geochemical treatment plant for the Industrial and Hazardous wastewater, are the following:

1. Chemical treatment - Chemical separation
2. Geochemical treatment (GACS)
3. Coagulation and Flocculation in a Coiled Pipe Reactor (CPR)
4. Induced air flotation (IAF)
5. Mechanical Micro - filtration
6. Disinfection - Purification (Chlorination)



A detailed description of Industrial and Hazardous Wastewater treatment plant's main stages is presented below



**Legend:**

- |                           |                                |
|---------------------------|--------------------------------|
| Chemicals Line: —————     | 1. Chemical Separation         |
| Geopolymer Line: —————    | 2. Geochemical Treatment       |
| Sludge Line: —————        | 3. Coil Pipe Reactor           |
| Wastewater Line: —————    | 4. Induced Air Flotation (Iaf) |
| Air Treatment Line: ————— | 5. Mechanical Microfiltration  |
|                           | 6. Chlorination                |

**1. Chemical treatment - Chemical separation**

The first stage of the wastewater treatment is the chemical separation which takes place into a special designed tank. This stage is of high significance for the process, in which occurs the separation of oil and solids from water. The wastewater is led inside the chemical's treatment tank. At the entrance of the tank, a chemical solution is added to the wastewater through dosing pumps, in order to help the separation process that will occur. The chemical tank has plate packs with proper orientation for maximizing the performance of oil/water and solids/water separation. Separated light fraction like oil is gathered to the top of the separator and the heavy fraction like solids and sludge is gathered to the bottom of the tank in sludge cones.

**2. Geochemical treatment (GACS)**

After the chemical separation, the waste is transferred to a special designed geochemical treatment reactor. The stage of the main geochemical treatment is the most important part of the treatment as the pollution load will be captured from the geopolymers. The geochemical reactor is equipped with a stirring system and through appropriate dosing systems the geopolymers are added to complete the process.

**3. Coil Pipe Reactor (CPR)**

After the completion of the geochemical treatment stage, the wastewater is led to a coil pipe reactor in which coagulation and flocculation take place. During this stage the proper reagents in proper quantities are added while mixing in the reactor, until the stage is completed. The CPR is a construction that allows the proper mixing of the chemicals with the wastewater by changing the geometric characteristics of the pipe. Chemicals can be injected into the pipe precisely at those points where they are most effective.

**4. Induced Air Flotation (IAF)**

After the wastewater is passed through the Coil Pipe Reactor, is led to a tank in which the Induced Air Flotation takes place. Flotation is a method of separating solids or liquids from water by introducing air. The bubbles attach to the particulate matter, and the buoyant force is great enough to cause the particle to rise to the surface. Induced Air Flotation (IAF) involves saturating the wastewater with air, directly in an aeration tank. The efficiency of an IAF system is to a considerable extent determined by the size of the micro air bubbles generated.

**5. Mechanical Micro - filtration**

After the completion of the IAF stage, the wastewater is led to a fully automated, pre-fabricated, self-cleaning microfiltration filter (tertiary treatment). The microfiltration filter has an automatic recirculation of wash water to remove the suspended solids that may have escaped from the previous processing stage.

**6. Disinfection (Chlorination)**

Finally, and after the microfiltration stage, the treated water has to be properly disinfected. Thus, before the wastewater is safely disposed of in the environment, suitable NaClO solutions are added through dosing systems in appropriate quantities and for a suitable time to ensure residual chlorine concentration in accordance with the requirements of the legislation.

- 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.

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