

ZETA Water & Wastewater

Treatment Technologies



Zirsakht Tadbir
Arian (zeta)



**We Make
Imaginations
Come True**

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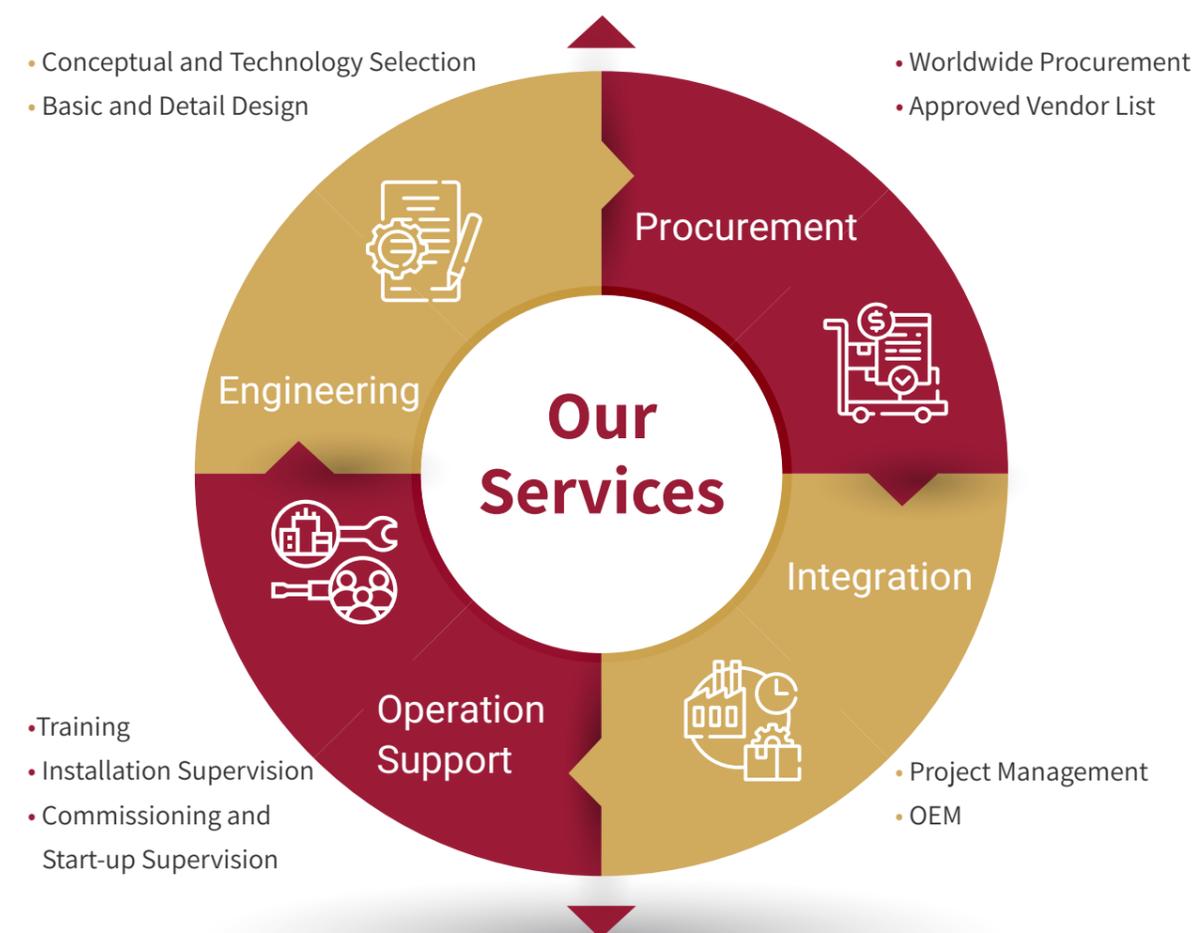
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About ZETA:

Zirsakht Tadbir Arian Co. (ZETA) stands as a private joint-stock company dedicated to providing engineering services, high-tech products, and tailored solutions. Our focus industries include:

- **Water and Wastewater**
- **Oil & Gas**
- **Waste Management**

ZETA focuses on ventures where innovation is key and others may lack experience. With the supporting of technologically pioneering partners, ZETA is committed to introducing novel concepts and efficiently executing projects to significantly enhance plant efficiency. By offering advanced processes and tailored solutions, ZETA has rapidly built a strong reputation, marked by the uniqueness of projects undertaken in the Middle East and globally.





Water and wastewater treatment play a crucial role in enhancing water quality for various purposes such as drinking, industrial processes, irrigation, sustaining river ecosystems, and recreational use in water parks. The treatment process focuses on removing or reducing contaminants from the initial wastewater or effluent, adjusting the degree of treatment to meet specific requirements.

Water & Wastewater Treatment Overview:

Zirsakht Tadbir Arian (ZETA) Company specializes in advanced water and wastewater treatment technologies. Our client-centric approach allows us to undertake full-scale EPC or turnkey projects, covering engineering, design, procurement, and construction, or manage individual phases selectively.

Key Features of Our Services:

- **Diverse Technologies:** ZETA provides cutting-edge technologies tailored for water and wastewater treatment, with a focus on industrial wastewater. Our solutions achieve recovery rates of up to 99%, optimizing efficiency and minimizing environmental impact.
- **Sustainability Commitment:** Leveraging the latest advancements in technology, we prioritize sustainability and environmental responsibility by reducing energy consumption and enhancing water recovery efficiency.

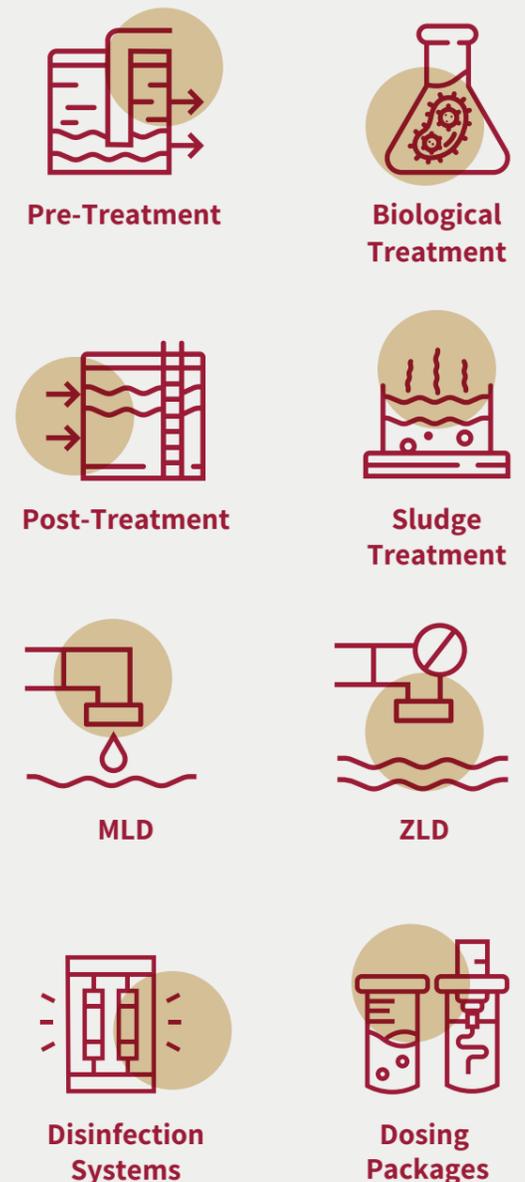
Industries We Serve:

ZETA provides water and wastewater solutions across a diverse spectrum of industries. Leveraging our expertise in understanding the unique properties of wastewater in various sectors, we seamlessly apply different technologies tailored to each industry's needs. The following is a glimpse of the industries we collaborate with. In essence, wherever there is wastewater, ZETA stands ready to deploy its technologies.



Our Technology Portfolio:

ZETA stands out by offering a versatile range of solutions and technologies, allowing us to provide expert consultation services to clients. Our recommendations are personalized based on factors such as **water feed quality, environmental compliance, and budget constraints**. This ensures clients receive effective and cost-efficient water and wastewater treatment solutions tailored to their specific needs. Our comprehensive range of technologies includes:



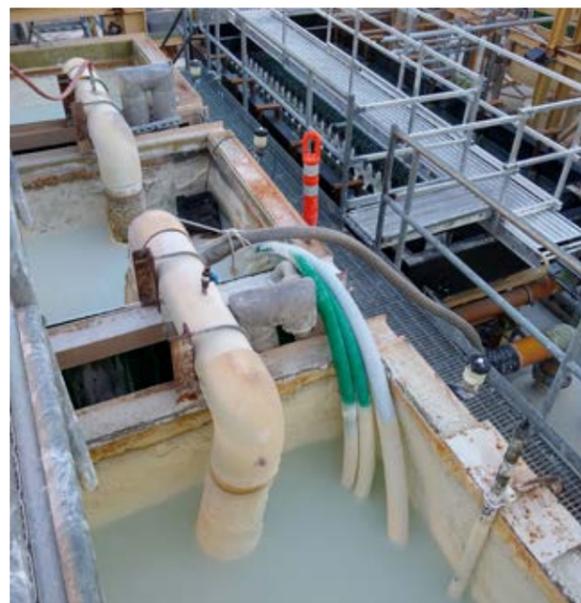
Water and Wastewater Pre-Treatment Process:

The pre-treatment phase stands as a pivotal starting point in our water and wastewater treatment processes. We believe effective pre-treatment can reduce both CAPEX and OPEX of the whole treatment plant. Through our expert pre-treatment techniques, we effectively remove impurities, solids, particles, and organisms from wastewater, ensuring the consistent attainment of desired water quality for subsequent processes. Our primary pre-treatment objectives are:

- Maintain a continuous and reliable water flow
- Prolong the lifespan of expensive followed units like reverse osmosis membranes, EDI/EDR, ...
- Ensure the standard quality of water sent to down stream units



Our pre-treatment processes fall into two distinct categories, each tailored to address specific types, methods, or materials to be removed in the final treatment phase:



1. Chemical Water Treatment: Chemical water treatment becomes essential when the presence of certain ions poses challenges for downstream operations. To address this, we employ a variety of chemical processes and innovative technologies, ensuring wastewater treatment is both safe and cost-effective. Our approach to chemical water treatment encompasses several techniques, including Softening and silica removal (using Na_2CO_3 or NaOH), Coagulation and Flocculation (utilizing alum or FeCl_3), and pH adjustment.

2. Physical Water Treatment

• Filtration

Utilizing state-of-the-art equipment, we employ physical treatment methods to effectively remove water contaminants. Our approach includes various filtration techniques such as sand filters and activated carbon filters. We also utilize advanced ultrafiltration (UF) methods with membranes like ceramic, hollow fiber, and tubular, ensuring efficient contaminant removal.

• Dissolved Air Flotation (DAF)

DAF is a physical-chemical process where air is dissolved in wastewater under pressure and then released, forming microbubbles. These bubbles cause suspended particles, oils, and contaminants to float to the surface, where they are skimmed off. The treated water is then directed for further treatment or discharge. It is particularly effective for high-strength wastewater with high levels of suspended solids and oils.

• Clarifiers

Clarifiers are tanks used to separate solids from liquids through sedimentation. Wastewater flow is slowed to allow particles to settle at the bottom, forming sludge. The clarified water, with reduced suspended solids, flows out for further treatment. Clarifiers are crucial in both municipal and industrial wastewater treatment for initial and secondary solid removal.

Filtration Methods:



Ultrafiltration Methods:





Biological Treatment:

Zirsakht Tadbir Arian (ZETA) Company is proficient in the implementation of biological wastewater treatment solutions designed to effectively address sewage containing organic matter, and diverse toxins.

We offer comprehensive EPC and turnkey projects, encompassing both aerobic and anaerobic processes, as well as the integration of both methodologies into complex systems. Our expertise ensures efficient and environmentally responsible wastewater treatment tailored to the specific needs of our clients.

Biological treatment processes in wastewater vary depending on the specific wastewater characteristics. However, ZETA Company offers a range of fundamental and essential stages and processes, including:



- **MBR:** MBR (Membrane Bioreactor) offers several advantages, including high-efficiency treatment, excellent pathogen removal, small footprint, and the ability to produce high-quality effluent suitable for reuse or discharge into sensitive environments.

- **A2O:** A2O (Anaerobic-Anoxic-Oxic) is known for its efficient nutrient removal, making it suitable for meeting stringent nitrogen and phosphorus removal requirements. It also reduces energy consumption compared to fully aerobic processes, thanks to its anaerobic stage. Additionally, they are flexible and adaptable for various types of wastewater treatment.

- **Ammonia Removal (Anammox):** Anammox is a biological process where specialized microorganisms convert ammonium and nitrite directly into nitrogen gas under low-oxygen conditions. This method efficiently removes ammonia from wastewater and is often combined with other nitrogen removal processes to minimize aeration and chemical use.

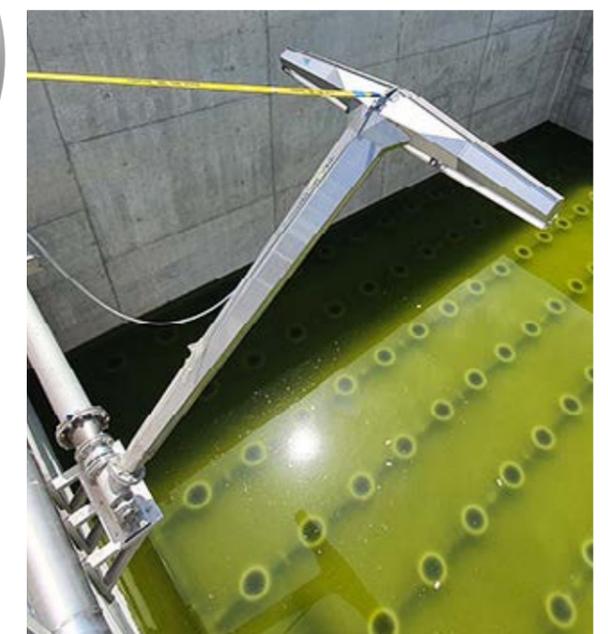


•**EAAS:** Extended Aeration Activated Sludge is recognized for its effective organic matter removal, providing stable and reliable treatment performance. Due to long sludge ages, extended aeration systems can be designed to provide nitrification. Also, the produced sludge in EAAS is more stable than conventional activated sludge, which causes easier dewatering.

•**MBBR:** MBBR (Moving Bed Biofilm Reactor) is known for its robustness, ability to handle variable loads, and resistance to shock loads. It is also relatively energy-efficient compared to some other treatment processes. MBBR systems are often used in applications where space is limited or as an upgrade to existing treatment plants.



•**SBR:** Sequencing Batch Reactors are suitable for large treatment units. They excel in nutrient removal, including nitrogen and phosphorus, depending on the specific configuration. SBRs also generate less excess sludge compared to conventional activated sludge processes, resulting in cost savings in sludge handling and disposal. Their intermittent aeration cycles make them both energy-efficient and environmentally friendly.



Sludge Treatment:

Sludge, the residual byproduct of municipal and industrial wastewater treatment processes, poses potential harm if not managed appropriately. At Zirsakht Tadbir Arian (ZETA), we offer advanced sludge treatment methodologies aimed at waste reduction, cost savings in disposal, adherence to environmental regulations, and waste to energy solutions. The following processes are available within this section:



1. Digestion (Anaerobic Digestion):



Sludge digestion technology is a crucial aspect of wastewater treatment, utilizing microbial processes to break down organic matter in sewage sludge. At Zirsakht Tadbir Arian (ZETA) we specialize in delivering highly efficient anaerobic digestion processes, ensuring significant biogas production and solids stabilization. Our expertise covers both thermophilic and mesophilic processes, customized to meet specific system goals. Considering factors such as sludge volume, site conditions, available space, and adaptability to fluctuating loads, we design single units or utilize two-stage and batch configurations to suit your unique needs.

We provide end-to-end solutions with Engineering, Procurement, and Construction (EPC) services, ensuring smooth execution of turnkey projects. Additionally, we offer essential equipment, including digesters and biogas system sourced exclusively from reputable manufacturers, guaranteeing reliability and performance in every aspect of our offerings. **Convert biogas into a valuable energy source with our comprehensive capabilities.**



2.THP (Thermal Hydrolysis Process):



Zirsakht Tadbir Arian (ZETA) Company proudly introduces the Thermal Hydrolysis Process (THP), a cutting-edge technology seamlessly integrated into wastewater treatment facilities for enhanced anaerobic digestion.

THP optimizes anaerobic digestion, significantly reducing residual sludge and environmental pollution. This advanced process also lowers construction and operational expenses related to digestion tanks. In the Thermal Hydrolysis Process, organic waste materials, such as wastewater sludge, undergo elevated temperature and pressure exposure, enhancing digestibility. This versatile technique accommodates various organic waste sources, including municipal wastewater treatment sludge, animal manure, and agricultural byproducts.



It efficiently produces high-quality biogas and organic fertilizers.

Key Benefits of THP:

- **Elevated biogas production rates.**
- **Enhanced anaerobic digestion efficiency.**
- **Improved sludge management and dewatering procedures.**
- **Substantial reduction in the carbon footprint.**
- **Production of high-quality biogas suitable as a renewable fuel source.**
- **Generation of a stable, pasteurized end product suitable for use as fertilizer (Sludge class 4).**

As experts in THP systems, ZETA Company offers comprehensive services, including design, engineering, equipment procurement, and construction. Our systems are known for robust performance, user-friendly operation, minimal maintenance, and a commitment to a continuous and dependable processing regimen.

3. Sludge Dewatering (Mechanical Processes):



Discover advanced sludge dewatering solutions at Zirsakht Tadbir Arian (ZETA) Company. Our array of methods, including belt filter presses, centrifuges, filter presses, and screw presses, efficiently reduces moisture content, resulting in a solid sludge cake.



4. Sludge Drying:



In instances where customers necessitate sludge with a moisture content below 10%, we possess the capability to execute sludge drying procedures. Sludge drying is attainable through diverse techniques, encompassing thermal drying methods (such as the utilization of rotary dryers or fluidized bed dryers), solar drying, or mechanical processes like paddle dryers. The ultimate objective of these processes is the production of biosolids or biofuels.



Minimum Liquid Discharge Treatment:

Our Minimum Liquid Discharge (MLD) approach focuses on diminishing waste release from diverse industrial wastewater treatment facilities. By recycling wastewater within the system, we aim to minimize environmental discharge. MLD systems, known for their complexity, require meticulous design and monitoring for optimal effectiveness. These systems complement other water treatment methods, contributing to environmental conservation and resource recovery with a target wastewater coverage of over %90.



About the MLD Process:

The MLD (Minimum Liquid Discharge) process involves various methods. ZETA Company primarily employs the Reverse Osmosis (RO) method as the core MLD technique, complemented by pre-treatment and post-treatment methods tailored to the specific characteristics of incoming wastewater. We specialize in designing and implementing cutting-edge MLD and RO systems, ensuring exceptional water recovery rates within MLD systems. Our RO systems cover both conventional RO and Batch RO (high pressure RO) technologies.



Batch RO (BARO):

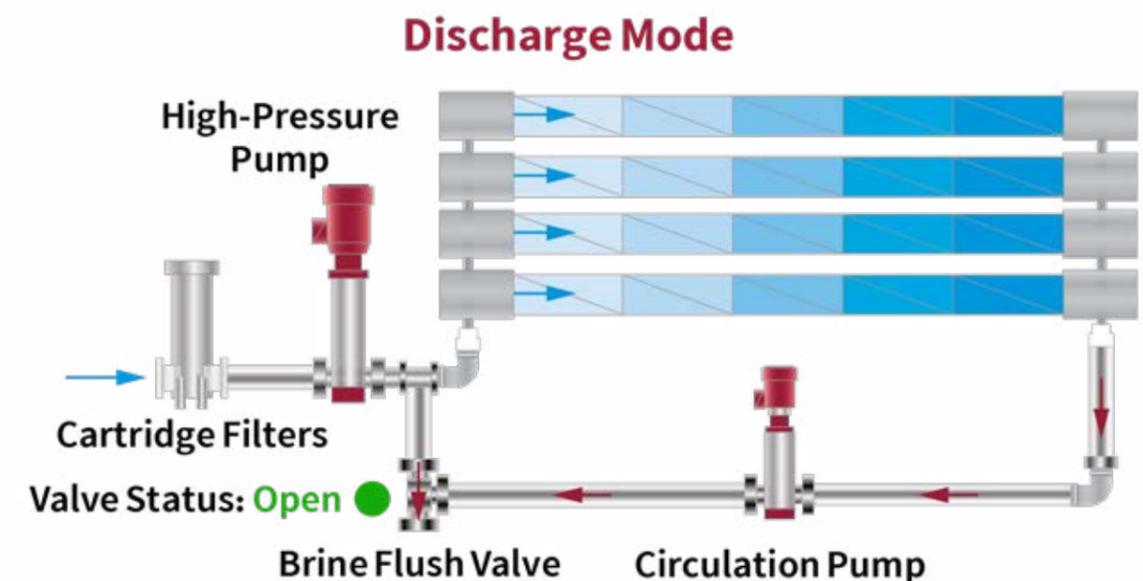
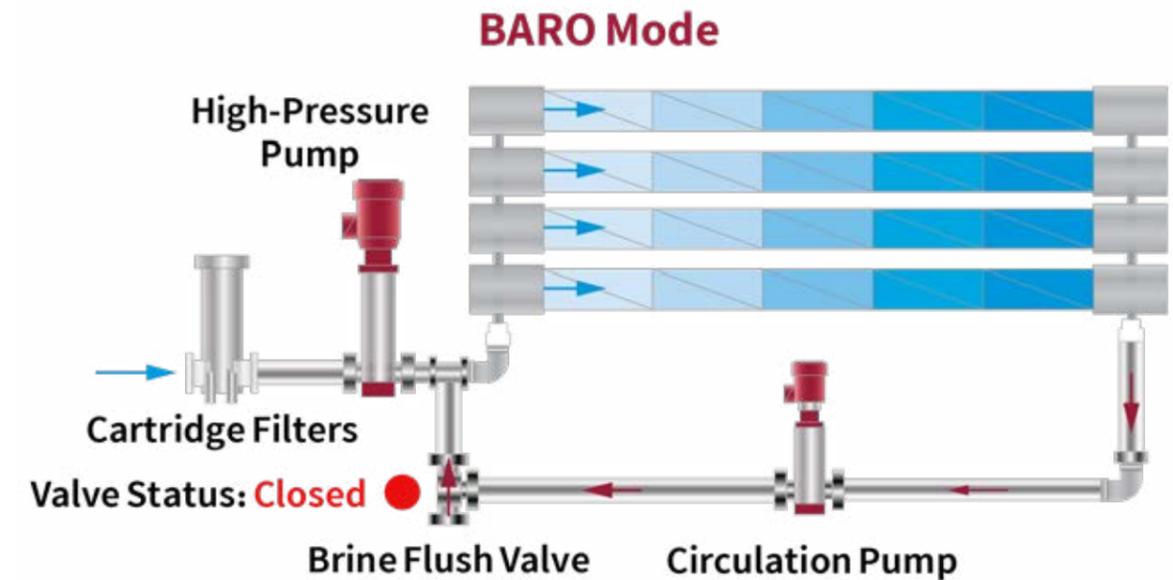
BARO (Batch RO) represents a novel closed-loop reverse osmosis system operating semi-batch, utilizing dead-end filtration. In this process, the feed is continuous, while the reject stream or concentrate is internally recirculated, ensuring turbulent flow to prevent salt precipitation.

The BARO concentrate is recirculated until one of the three objectives is achieved:

- **Conductivity reaches a preset set point.**
- **The maximum working pressure is reached.**
- **The expected conversion is obtained.**

Features and Advantages of BARO:

- **Maximum Recovery (15%-30% more than conventional RO)**
- **Reduced Brine Waste**
- **Enhanced Reliability with minimized fouling and scaling**
- **Unmatched Flexibility**
- **Lower Energy Consumption**



Zero Liquid Discharge Treatment:

Zero Liquid Discharge, commonly known as ZLD is recognized as one of the most effective methods for treating harsh wastewater, often seen as a final resort due to its high efficiency. By employing state-of-the-art equipment, ZLD minimizes the presence of waste and pollutants in wastewater, producing water free of contaminants. The primary goal is to eliminate pollutants, thereby protecting the environment.



Zirsakht Tadbir Arian (ZETA) specializes in turnkey ZLD projects, offering end-to-end services from design to operation. Our focus is to minimize investments, reduce operational expenses, and deliver customized solutions tailored to each client's specific requirements. Our services encompass technical consulting, equipment sourcing, installation, commissioning, training, and ongoing post-sales support.

Advantages of ZLD Technology by Zirsakht Tadbir Arian:

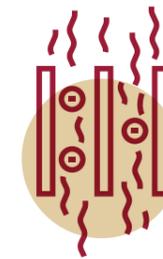
- Complete Wastewater Treatment:** Thorough purification of industrial wastewater, preventing environmental pollution, and yielding high-quality, crystal-clear water output, with nearly 100% water recovery.
- Varied Output:** Depending on incoming wastewater type, the system can produce solid outputs like chemical fertilizers, animal feed, or salt.
- Automated Cleaning:** The system operates around the clock, ensuring continuous treatment.
- Operator Independence:** Thanks to its automation, the system does not require constant operator oversight.

ZLD Applications in Various Industries:

ZLD technology offers significant benefits to industries dealing with hazardous wastewater that is difficult to further treat by other methods or where containment is valuable. Zirsakht Tadbir Arian Company specializes in customizing ZLD systems to meet the specific needs of various industries, ensuring effective wastewater treatment solutions.

Water and Wastewater Post-Treatment Process:

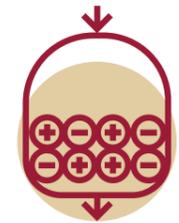
The post-treatment process is a critical phase focused on sustaining water stability, ensuring disinfection, managing corrosion in water supply systems, and addressing potential processes like degasification or air stripping. Key considerations for power and treatment plants in post-treatment include assessing target composition, monitoring mineral content introduced during treatment stages, implementing effective disinfection, and selecting appropriate storage materials for the final water. Various methods are employed for post-treatment, including Electrodeionization (EDI), Ion-Exchange, Mixed Bed, Chemical Injection, etc.



Electrodeionization Method (EDI)



Ion-Exchange Method



Mixed Bed Method

Zirsakht Tadbir Arian (ZETA) Company carefully selects the most suitable method, taking into account regulatory requirements, system design, water quality criteria, and water chemistry. With the utilization of cutting-edge technologies and equipment, ZETA excels in executing these processes, ensuring optimal results.



Disinfection Systems:

In the final stages of water treatment, disinfection serves as a crucial step to eliminate organisms from the treated water prior to its return to the water system. This process effectively curtails the transmission of waterborne diseases by diminishing microbial and bacterial populations to a controlled level.

Ultraviolet (UV) systems:

Our Ultraviolet (UV) systems are widely adopted in industrial water and wastewater treatment for their eco-friendly, chemical-free approach. They excel in eliminating harmful microorganisms and pathogens without the need for chemical intervention.

Chlorine Disinfection system:

Ensure effective water disinfection with our gas chlorination systems. This system effectively eliminates a wide array of pathogens. The advantage of chlorination lies in its prolonged disinfection effect, maintaining water purity long after chlorine application.



Dosing Packages:

Zirsakht Tadbir Arian Company presents customized dosing package systems, tailored to meet your distinct requirements. Our systems deliver precise control over chemical and additive addition in water and wastewater treatment processes, as well as various industrial applications.

Serving purposes like disinfection, pH adjustment, coagulation, flocculation, and corrosion control, our solutions are meticulously designed for efficiency.



Our Offerings Include:

- **Softening Dosing system:** The softening dosing system eliminates both temporary and permanent hardness from water. Chemical additives, such as lime or soda, induce the formation of insoluble precipitates that are easily removed, resulting in softened water. Consider our Na_2CO_3 & NaOH Preparation & Dosing Package for effective water softening solutions.
- **Chlorination and Dechlorination Systems:** Ensure effective water disinfection with our liquid chlorination systems (NaOCl Dosing Package). For chlorine removal, SMBS (Sodium Metabisulfite) Preparation and Dosing Packages can be utilized.
- **pH Adjustment Systems:** Maintain optimal pH levels effortlessly with our systems featuring tanks for acid or alkali solutions, dosing pumps, and pH sensors. Explore options like the H_2SO_4 Package, Caustic (NaOH) Package, and HCL Dosing Package.
- **Coagulation and Flocculation Systems:** Initiate coagulation and flocculation processes seamlessly using our systems that introduce chemicals like aluminum sulfate (Alum) or ferric chloride (FeCl_3 Package). Additionally, explore our Polyelectrolyte Preparation & Dosing Packages.
- **Polymer Dosing Systems:** Optimize sludge dewatering processes with our polymer dosing systems, featuring preparation units, mixers, and dosing pumps.
- **Antiscalant and Antifoulant Dosing system:** Our antiscalnet package is used in RO/BARO system to prevent scaling and can increase their efficiency and membrane lifetime.
- **Urea Dosing Package:** Urea dosing package is mainly used to balance the nitrogen base nutrient in biological wastewater treatment.

The examples above showcase just a glimpse of our diverse dosing systems. We stand ready to provide additional types and configurations based on your specific requests.

Our Water and Wastewater Treatment Projects:

Kangan Perto Refining Company Dewatering Package



Location: Iran , Kangan

Description : Engineering and designing of sludge dewatering package

Capacity: 5 m³/hr biological sludge

Karbala Wastewater Treatment Plant Module III, Anaerobic Digestion Plant



Location: Iraq

Description: Physical and biological methods of municipal wastewater treatment with biogas treatment system and CHP power generation

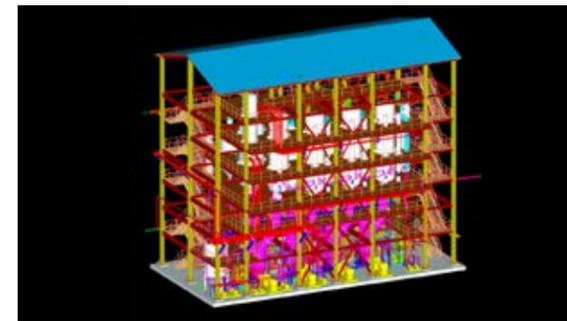
Capacity: 41,630 kg. Ds/d (778 m³/d) with 4 digesters

The Esfahan Oil Refinery UF Package South Refinery



Location: Esfahan
 Description : 3 trains of hollow fiber UF with backwash, CIP, self cleaning filters, and injection packages
 Capacity: 500 m³/hr feed

ZLD for The Wastewater Treatment Of Esfahan Oil Refinery



Location: Iran , Esfahan
 Description: MEE with crystallization
 Capacity: 50 m³/hr
 Final product:
 Salt moisture < 7%
 Water TDS < 100ppm

MLD for The Wastewater Treatment Of Esfahan Oil Refinery



Location: Iran, Esfahan
 Description: Units included softening+ clarification UF+ Batch RO
 Capacity: 400 m³/hr Feed
 Recovery: 85%

The Esfahan Oil Refinery Demineralization (DM) Water Treatment Plant for South Refinery



Location: Iran , Esfahan
 Description : Units included self-cleaning + 4 train UF+ 4 train RO
 Capacity: 500 m³/hr (RO permeate)
 Recovery: 90%

ZLD Package for Ilam Petrochemical Complex (ILPC)



Location: Iran , Ilam
Description: MEE ZLD Unit
Capacity: 33.5 m³/hr

Gachsaran Petrochemical Olefin Project



Location: Iran , Gachsaran
Description: MLD+ZLD plant, based on an advanced softening, ultrafiltration, two stages of reverse osmosis (RO+High Pressure RO), multiple effect evaporator, crystallization package (MEE ZLD), chemical storage and dosing
Capacity: 250 m³/hr feed with TDS~9000 ppm

Gachsaran Injection Packages



Location: Iran, Gachsaran
Description: Design and construction of chemical injection package for Softening, Biological, UF, and RO units including: NaOCl, HCl, NaOH, Polyelectrolyte, Antiscalant, SMBS, Na₂CO₃, FeCl₃, H₃PO₄, UREA

Pars Oil Refinery Industrial WWTP



Location: Iran, Tehran
Description: Redesign, modification and MBR replacement
Capacity: 80 m³/h

ZETA

Always Gets The Job Done



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