

Project Case Study

AQUAEZ™ WASTEWATER RECYCLE
AND ZERO LIQUID DISCHARGE
FOR CTX INDUSTRY IN CHINA



Shenhua Xinjiang 680 KTA Coal-based New Materials Project Urumqi City, Xinjiang Uygur Autonomous Region

To reduce its carbon and water footprint, and to ensure statutory compliance, Shenhua Coal Oil Chemical Co. Ltd implemented a project to construct a system to recycle water from wastewater generated by the plant and eliminate waste water discharge (ZLD). Shenhua Xinjiang selected Aquatech to design, engineer, and supply the wastewater recycle and ZLD system, and to supervise installation and commissioning.

Project Case Study

AQUAEZ™ WASTEWATER RECYCLE
AND ZERO LIQUID DISCHARGE
FOR CTX INDUSTRY IN CHINA

AQUATECH SOLUTION

Aquatech supplied a fully integrated and automated system developed by Aquatech for the CTX market utilizing state-of-the-art AquaEZ™ technology consisting of HERO™ (High Efficiency Reverse Osmosis) followed by a HEVAP™ (High Efficiency Evaporation) evaporator and a crystallizer to eliminate liquid discharge from the plant.

The AquaEZ™ plant consists of three systems; water recycle, zero liquid discharge, and recycle water post treatment.

Water Recycle

The CTX wastewater stream has high scaling and fouling potential due to the presence of hardness, organic species, ammonia, silica, etc. The wastewater stream is first concentrated by the HERO system, consisting of lime softening, filtration, ion exchange, ultrafiltration, and RO membranes, achieving high recovery of low TDS permeate for reuse by the CTX facility.

HERO is a patented process, most suited for applications where feed water is high in both organic and inorganic foulants. The operating environment of a HERO system eliminates scaling and fouling by biological growth, organic species and oil and grease.

The result is that an AquaEZ system requires less downtime for cleaning than a conventional RO based wastewater treatment system.



Project Case Study

AQUAEZ™ WASTEWATER RECYCLE
AND ZERO LIQUID DISCHARGE
FOR CTX INDUSTRY IN CHINA

Zero Liquid Discharge

The concentrated brine from the Water Recycle system is further concentrated in the ZLD system, recycling the remaining water as distillate. The ZLD system comprises a HEVAP evaporator for brine concentration and crystallizer to achieve ZLD.

The concentrated HERO reject brine from the Water Recycle system is non-scaling. The HEVAP evaporator is designed with a very low ΔT (temperature difference between the heating medium and the boiling brine) and a high recirculation rate. The result is scale free evaporator operation and lower power consumption.

The crystallizer is the final brine concentration step. The crystallizer further concentrates the brine from the evaporator. As concentration occurs, salts are precipitated, grown into crystals and harvested by a centrifuge. The dry salt is taken for suitable disposal.

Recycle Water Post Treatment

The permeate from the Water Recycle system and distillate from the ZLD system is treated to reduce NH_3 and TOC to specified limits. A stripping tower is used to treat the distillate and the combined distillate and permeate is treated by activated carbon and SAC ion exchange columns.



Project Case Study

AQUAEZ™ WASTEWATER RECYCLE
AND ZERO LIQUID DISCHARGE
FOR CTX INDUSTRY IN CHINA

DESIGN WATER ANALYSIS: COMPOSITE STREAM		
Parameters	Units	Composite Feed
pH	---	6.5-8.5
Total Dissolved Solids	mg/L	~6057
Chemical Oxygen Demand	mg/L	149.6
Hardness as CaCO ₃	mg/L	880
NH ₃ ⁺ - N	mg/L	13.4
Fluorides as F	mg/L	25
Silica as SiO ₂	mg/L	91
Bicarbonate as HCO ₃	mg/L	136
Chlorides	mg/L	1465
Sulphates	mg/L	737
Sodium	mg/L	2241
Nitrate as NO ₃ ⁻	mg/L	549.2
Calcium	mg/L	160
Magnesium	mg/L	96
TOC	mg/L	63.4
TSS	mg/L	22

TREATED WATER ANALYSIS		
Parameters	Units	Outlet Concentration
Turbidity	NTU	< 3
Total Dissolved Solids	mg/L	≤ 200
Total hardness, as CaCO ₃	mg/L	≤ 3
Total alkalinity as CaCO ₃	mg/L	≤ 20
BOD	mg/L	< 0.5
COD	mg/L	< 5
TOC	mg/L	≤ 2
Fluoride	mg/L	< 0.5
Chloride	mg/L	≤ 30
Sulphate	mg/L	≤ 30
Nitrate nitrogen	mg/L	≤ 50
Silica	mg/L	< 1
Phosphate	mg/L	< 0.02
Sodium	mg/L	< 35
Aluminum	mg/L	< 0.01
Copper	mg/L	< 0.01
Manganese	mg/L	< 0.01
Zinc	mg/L	< 0.01

Project Case Study

AQUAEZ™ WASTEWATER RECYCLE
AND ZERO LIQUID DISCHARGE
FOR CTX INDUSTRY IN CHINA

SYSTEM FLOW DIAGRAM

