



**CONSEPTEC**

**CONCENTRATION  
SEPARATION  
TECHNOLOGY**

**Conseptec GmbH**

Am alten Leuchfeuer 14, 24340 Eckernförde, Germany

+49 176 81385281

[www.conseptec.net](http://www.conseptec.net)

E-mail : [info@conceptec.net](mailto:info@conceptec.net)

[WWW.CONSEPTEC.NET](http://WWW.CONSEPTEC.NET)





## 2024 GLOBAL PRIZE INNOVATION IN DESALINATION (GPID)



## 2026 WEX GLOBAL PRIZE SEVILLE SPAIN



## 公司简介

CONSEPTEC 专注于开发非常规膜技术，以解决全球液体浓缩和分离应用领域不断增长的挑战。

CONSEPTEC 于 2012 年在德国成立，总部位于 ECKERNFORDE。2024 年正式设立中国分公司，进一步拓展亚太市场，并在全球范围内设立了多个销售处及分支机构，形成了覆盖欧洲、北美、亚洲的国际化服务网络。同时，CONSEPTEC 作为 WATER POSITIVE 成员，积极践行可持续水资源管理的理念，为全球水资源保护和改善贡献力量。

CONSEPTEC 基于常规超滤 / 反渗透膜技术，逐步构建完整产品矩阵：

- 陶瓷超滤膜（压力式和平板式）
- 管式超滤膜（TUF & TMBR）
- 特种反渗透膜（DTRO & STRO）

同时 CONSEPTEC 提供了以膜法处理为基础的工业流体过程处理与废水资源化整体解决方案，已成功应用于：

- 垃圾渗滤液全量化处理
- 工业高盐废水处理
- 零排放和近零排放
- 油气田废水（压裂反排液 & 回注水）资源化
- 锂电正极材料回收
- 电镀 / 印染 / 纺织高难度废水处理

2024 年 CONSEPTEC 公司荣获沙特王国水务总局颁发的年度海水淡化创新大奖 (GPID 大奖)，作为海水淡化领域全球最高荣誉！  
2026 年，CONSEPTEC 公司又获得了 WEX GLOBAL 颁发的“水与循环经济奖”。这一荣誉突显了 CONSEPTEC 在促进可持续发展和创新实践方面的重要作用！

## COMPANY INTRODUCTION

Conseptec focuses on developing no-conventional membrane technologies to address the growing global challenges in liquid concentration and separation.

Founded in Germany in 2012 and headquartered in Eckernförde, Conceptec officially established its Chinese subsidiary in 2024 to further expand the Asia-Pacific market. With sales offices and branches worldwide, it has built an international service network covering Europe, North America and Asia. As a member of WATER POSITIVE, Conceptec actively promotes sustainable water resource management and contributes to global water conservation.

Conseptec, based on conventional UF/RO membrane technologies, has gradually built a comprehensive product portfolio:

- Ceramic UF membranes (pressurized & flat-sheet)
- Tubular UF membranes (TUF & TMBR)
- Modified RO Membrane (DTRO & STRO)

Conseptec also provides integrated membrane-based solutions for industrial fluid processing and brine mining. These have been successfully applied in:

- Landfill leachate treatment
- Industrial high-salinity waste water treatment
- Zero Liquid Discharge (ZLD) & Minime Liquid Discharge (MLD)
- Oil & Gas fracturing flowback fluid & reinjection water Treatment
- Lithium Battery Cathode Recycling
- High-Difficulty Wastewater Treatment for Electroplating, Printing, Dyeing & Textile

In 2024, Conceptec was awarded by the Saudi Water Authority (SWA) Sustainable Water Production and Environmental Conservation Prize at Global Prize for Innovation in Desaliation (GPID)

In 2026, Conceptec was awarded the Water & Circular Economy Prize by Wex global in Seville Spain, recognizing its outstanding role in advancing sustainable development and innovation.



LANDFILL LEACHATE  
垃圾渗滤液



INDUSTRIAL WASTE WATER  
工业废水



ZLD & MLD  
零排放 & 近零排放



OIL & GAS FRACTURING & REINJECTION  
油气田压裂反排液 & 回注水



LITHIUM BATTERY RECYCLING  
锂电材料回收



ELECTROPLATING, PRINTING, DYEING & TEXTILE  
电镀 / 印染 / 纺织废水

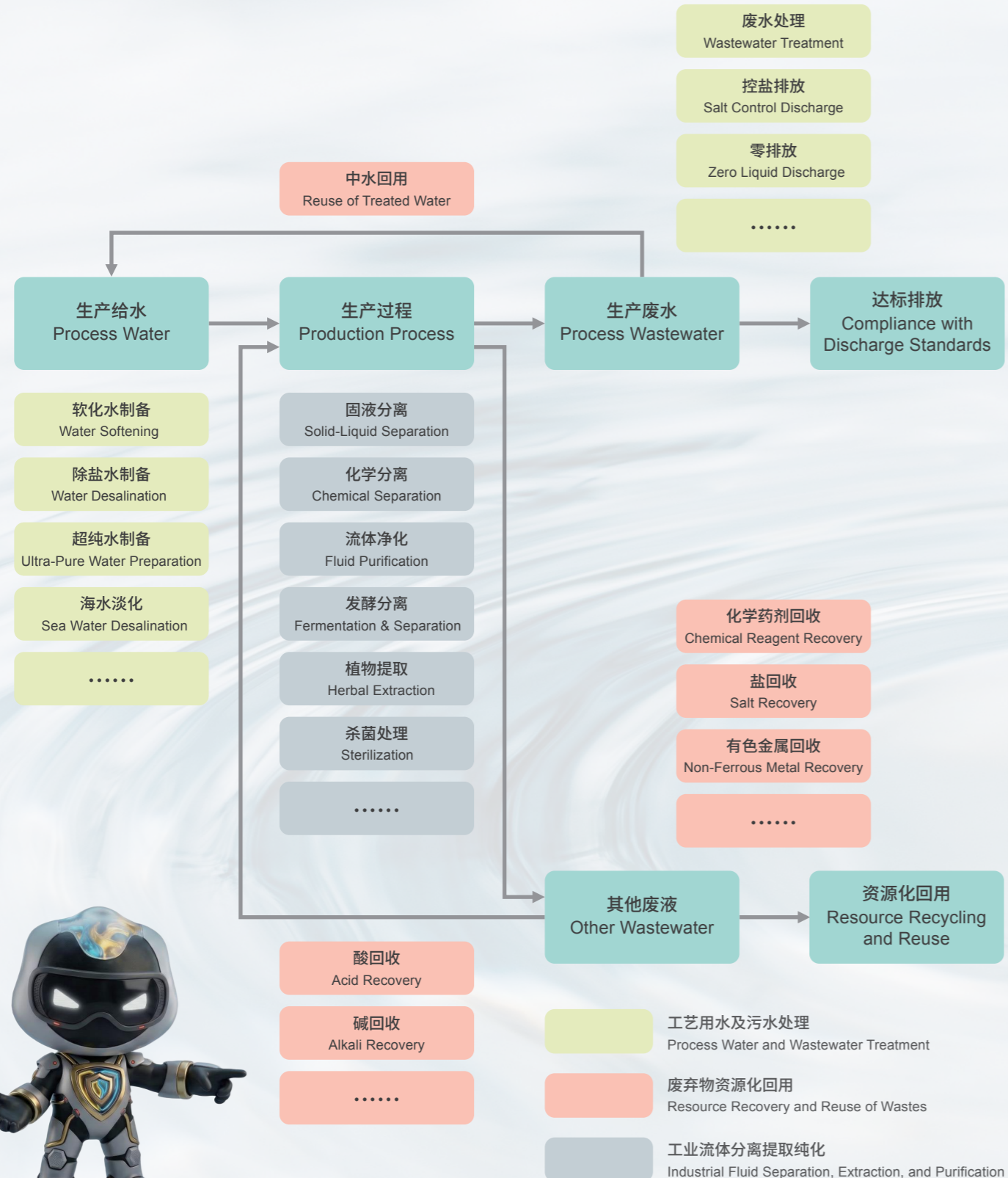


# Contents

- 05 INDUSTRIAL FLUID FULL-CHAIN SOLUTIONS  
工业流体全链路解决方案
- 
- 06 CONSEPTEC PROFESSIONAL SOLUTIONS  
CONSEPTEC 解决方案专业领域
- 
- 07 TYPICAL PROCESSES OF ZERO DISCHARGE AND FRACTIONAL CRYSTALLIZATION  
零排放及分质结晶典型工艺
- 
- 09 INDUSTRIAL HIGH-SALINITY WASTE WATER TREATMENT  
工业高盐废水处理
- 
- 12 ZERO LIQUID DISCHARGE (ZLD) & MINIME LIQUID DISCHARGE (MLD)  
零排放和近零排放
- 
- 14 LANDFILL LEACHATE TREATMENT  
垃圾渗滤液全量化处理
- 
- 16 OIL & GAS FRACTURING FLOWBACK FLUID & REINJECTION WATER TREATMENT  
油气田废水（压裂反排液 & 回注水）资源化
- 
- 19 LITHIUM BATTERY CATHODE RECYCLING  
锂电正极材料回收
- 
- 21 HIGH-DIFFICULTY WASTEWATER TREATMENT FOR ELECTROPLATING,  
PRINTING, DYEING & TEXTILE  
电镀 / 印染 / 纺织高难度废水处理
-

# 工业流体全链路解决方案

## INDUSTRIAL FLUID FULL-CHAIN SOLUTIONS



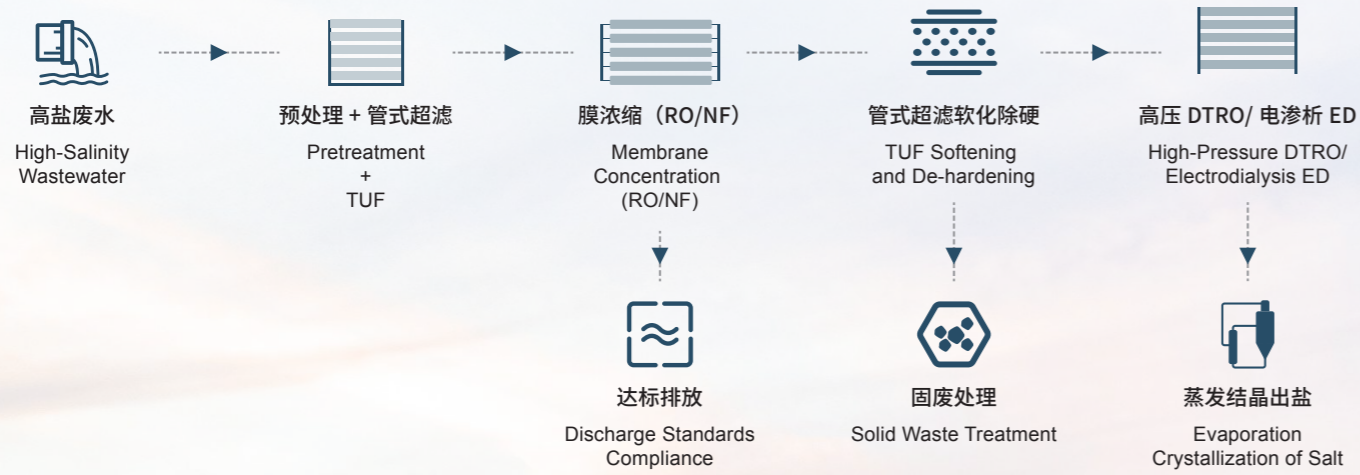
# CONSEPTEC 解决方案专业领域

## CONSEPTEC PROFESSIONAL SOLUTIONS



# 零排放及分质结晶典型工艺

## TYPICAL PROCESSES OF ZERO DISCHARGE AND FRACTIONAL CRYSTALLIZATION

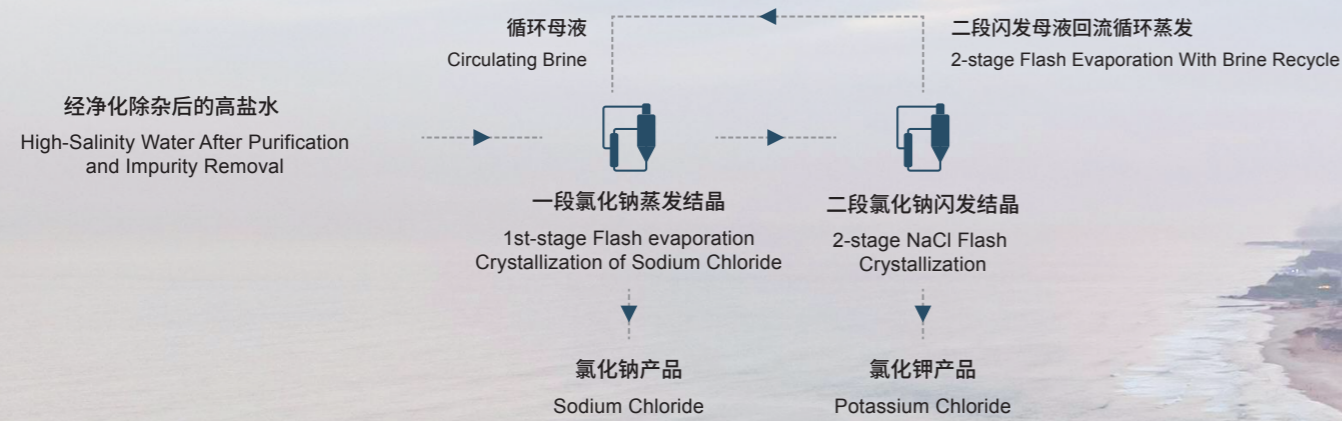


### 钾 / 钠分离 (基于钠高钾低或接近的工况):

总体遵循 "高温析钠, 低温析钾" 原则

### Potassium / Sodium Separation (Under operating conditions with high sodium and low or similar potassium content):

Generally follows the principle of "sodium precipitation at high temperature, potassium precipitation at low temperature".

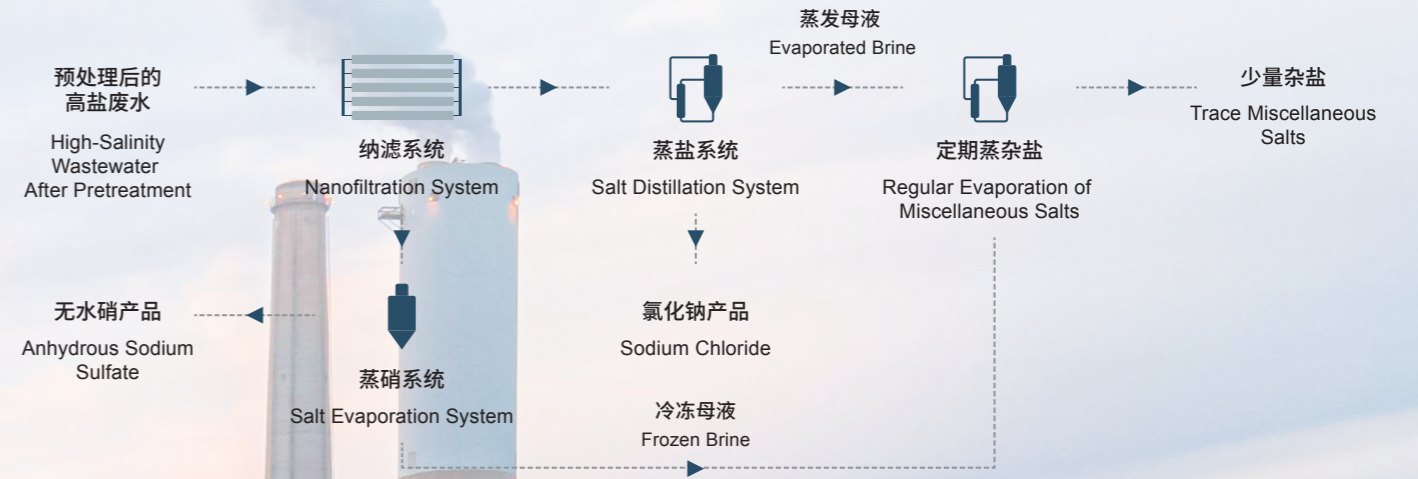


### 盐 / 硝分离 (基于纳滤系统):

利用  $\text{Cl}^-$  和  $\text{SO}_4^{2-}$  离子半径或电荷特性等差异

### Salt / Nitrate Separation (Based on Nanofiltration System):

Utilizing the differences in ionic radius or charge characteristics between  $\text{Cl}^-$  and  $\text{SO}_4^{2-}$



# INDUSTRIAL HIGH-SALINITY WASTE WATER TREATMENT

## 工业高盐废水处理

在盐化工、氯碱化工、煤化工、石油化工、制药等行业的工业废水零排放处理上，经常会遇到同时含有氯化钠、氯化钾或氯化钠、硫酸钠的混合溶液或废水，含盐量较高。目前，高盐废水处置大部分采用直接蒸发获取混盐，当作固废进行处置，缺乏经济效益。

高盐废水处置是世界性难题，分盐资源化是高盐废水处置的根本出路。

In salt chemical, chlor-alkali, coal chemical, petrochemical, pharmaceutical and other industries, zero liquid discharge treatment often deals with high-salinity wastewater mixed with sodium chloride, potassium chloride or sodium sulfate. Most such wastewater is evaporated to produce mixed salt for solid waste disposal with low economic benefit. High-salinity wastewater treatment is a global challenge, and salt separation and resource utilization is the fundamental solution.

## CONSEPTEC优势

### WHY CONSEPTEC

CONSEPTEC 掌握钾 / 钠分离的核心技术，基于热力学及结晶学，依靠系统精细化设计及丰富实践经验，即使在高浓度硫酸根的情况下，杂质析出位置也完全可控，保证高价值钾盐产品充分提取的同时，更保证钠盐产品符合工业盐标准。

CONSEPTEC masters core K-Na separation technology. Based on thermodynamics and crystallography, with refined system design and rich experience, it fully controls impurity precipitation even under high sulfate content. It efficiently extracts high-value potassium salts and produces sodium salts meeting industrial salt standards.



### 专业研发团队 PROFESSIONAL R&D TEAM

与知名大学合作开展分盐专项研究，配置专业研发团队，为分盐项目工艺设计提供可靠的理论数据。

Cooperate with renowned universities to carry out special research on salt separation, deploy a professional R&D team, and provide reliable theoretical data for the process design of salt separation projects.



### 分盐过程模拟 SALT SEPARATION PROCESS SIMULATION

根据水质数据，通过软件模拟出分质提盐过程确定各个节点物料情况为工艺路线选择提供可靠依据。

Based on water quality data, simulate the graded salt extraction process via software to determine material conditions at each node, providing a reliable basis for the selection of process routes.



### 分盐设备选择 SALT SEPARATION EQUIPMENT SELECTION

根据设计需求和水质特性，选择合适的结晶设备类型，优化设备结构，以兼顾投资与运行成本。

Select suitable crystallization equipment and optimize structure based on design requirements and water quality to balance capital and OPEX.

## RINSE SOLUTION POTASSIUM-SODIUM SEPARATION

### 漂洗液钾钠分离

前端水洗工序中高氯次氧化锌粉、烧结灰和飞灰漂洗产生的经净化除杂后的洗灰水，主要成分为氯化钠、氯化钾。

Purified washing water from pre-washing zinc oxide powder, sinter ash and fly ash mainly contains sodium chloride and potassium chloride.



#### MAIN PROCESS 主体工艺

软化 + TUF + 反渗透 + 三效逆流提钠 + 闪发冷却提钾

Softening + TUF + Reverse Osmosis + Three-effect Countercurrent Sodium Recovery + Flash Cooling Potassium Recovery

#### PROJECT HIGHLIGHTS 项目亮点

氯化钠干盐纯度 $\geq 95\%$ ，氯化钾纯度 $\geq 85\%$ ，可作为业主的副产品进行销售。

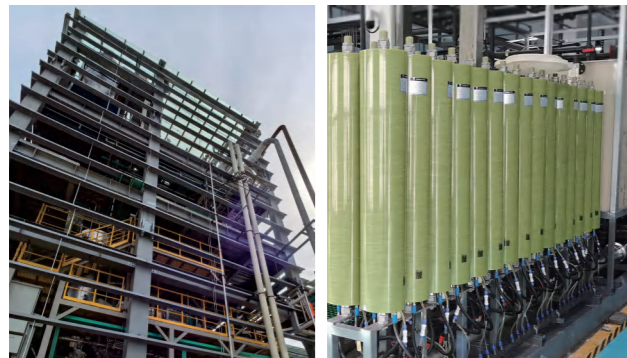
Sodium chloride purity  $\geq 95\%$ , potassium chloride purity  $\geq 85\%$

## SEPARATION OF SALTS AND NITRATES FROM MINE WASTEWATER

### 矿井废水盐硝分离

处理对象为某煤矿矿井高盐废水，主要成分为氯化钠、硫酸钠。

The treated wastewater is high-salinity coal mine wastewater, mainly containing sodium chloride and sodium sulfate.



#### MAIN PROCESS 主体工艺

调节池澄清软化 + 精密过滤 + 超滤 + 软化 + 反渗透 + DTRO + 一段蒸发提硫酸钠 + 冷冻制芒硝 + 二段蒸发提氯化钠

Regulating tank clarification & softening + fine filtration + ultrafiltration + softening + RO + DTRO + 1st-stage evaporation for sodium sulfate + freezing for mirabilite + 2nd-stage evaporation for sodium chloride

#### PROJECT HIGHLIGHTS 项目亮点

氯化钠纯度:  $\geq 93.3\%$ ，硫酸钠纯度 $\geq 99.0\%$

NaCl purity  $\geq 93.3\%$ , Na<sub>2</sub>SO<sub>4</sub> purity  $\geq 99.0\%$



# ZERO LIQUID DISCHARGE (ZLD) & MINIME LIQUID DISCHARGE (MLD)

## 零排放和近零排放

### 处理成本高

工艺流程长，能耗高，企业处置成本高，负担大。

### HIGH PROCESSING COST

Long process flow, high energy consumption, high disposal cost and heavy enterprise burden.

### 难处置

处理难度大，部分技术水平有限，难达到真正的长期稳定运行。

### DIFFICULT TO DISPOSE

It is difficult to treat. Restricted by limited technical capacity, it is hard to achieve genuine long-term stable operation.

### 成分复杂

成分复杂，水质波动大，部分废水含有重金属、有毒物质。

### COMPLEX COMPOSITION

Complex composition with great water quality fluctuation; part of the wastewater contains heavy metals and toxic substances.

### 产水不达标

蒸发温度较高，污染物易随蒸汽逸出，蒸馏水水质差，导致最终产水难以达标排放。

### SUBSTANDARD WATER DISCHARGE

High evaporation temperature causes pollutants to escape with steam, resulting in poor distillate quality and substandard water discharge.

### 易结垢

废水具有盐含量高、有机物浓度高等特点，容易产生结垢和腐蚀现象。

### PRONE TO SCALING

The wastewater features high salt content and high organic matter concentration, which easily cause scaling and corrosion.

### 无法出盐

高盐废水难以进行盐分离，盐分无法回收。

### FAILED TO PRODUCE SALT

It is hard to separate salt from high-salinity wastewater, and salt cannot be recycled.

CONSEPTEC 深耕工业废水处理，依托实战经验创新技术方案，凭借特种分离膜及高效节能蒸发设备，攻克废水处理难题，实现高难度废水零排放落地。

CONSEPTEC focuses on industrial wastewater treatment. It innovates solutions with practical experience, tackles tough issues via special separation membranes and energy-saving evaporators, and achieves zero discharge of complex wastewater.



## RARE EARTH HIGH-SALINITY WASTEWATER TREATMENT

### 稀土高盐废水处理

处理能力为 60M<sup>3</sup>/D 的高盐废水项目。处理对象为稀土提炼过程中产生的废液，采用膜浓缩 +MVR 强制循环蒸发结晶工艺，通过蒸发器蒸发浓缩后，离心机分离结晶盐。

This high-salinity wastewater project has a capacity of 60 cubic meters per day. It treats waste liquid from rare earth extraction, adopting membrane concentration plus MVR forced-circulation evaporative crystallization process. Crystallized salt is separated by centrifugation after evaporation and concentration.



#### MAIN PROCESS 主体工艺

调节池澄清软化 + 精密过滤 + 超滤 + 软化 + 反渗透 + MVR 强制循环蒸发结晶

Regulating tank clarification & softening + fine filtration + ultrafiltration + softening + RO + 1st-stage evaporation for sodium sulfate + freezing for mirabilite + 2nd-stage evaporation for sodium chloride

#### PROJECT HIGHLIGHTS 项目亮点

系统运行稳定，运行成本低，产水水质达标。

Stable system operation, low running cost and qualified water output.



## POWER PLANT DESULFURIZATION WASTEWATER TREATMENT

### 电厂脱硫废水处理

针对电厂脱硫废水，采用 CONSEOTEC 膜浓缩 + 蒸发结晶工艺，最终无外排废水。

Adopt CONSEPTEC membrane concentration and evaporative crystallization for power plant desulfurization wastewater, achieving zero wastewater discharge.



#### MAIN PROCESS 主体工艺

调节池澄清软化 + 精密过滤 + 超滤 + 纳滤 + 反渗透 + MVR 强制循环蒸发结晶

Regulating tank clarification & softening + fine filtration + UF + NF + RO + MVR forced circulation evaporative crystallization

#### PROJECT HIGHLIGHTS 项目亮点

系统运行稳定，运行成本低，产水水质达标。

Stable system operation, low running cost and qualified water output.

## TREATMENT OF LANDFILL LEACHATE

### 垃圾渗滤液处理



#### 处理难度大

水质变化大，污染物浓度高，可生化性差，常规工艺难以处理。



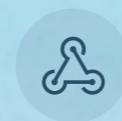
#### 处理程度低

水质 COD 浓度高，膜系统等无法继续处理，传统蒸发系统处理程度低，母液量大。



#### 易结垢，产量衰减快

水质硬度高，传统蒸发系统易结垢，处理量衰减严重。



#### 建设周期长，要求高

蒸发器是关键设备，而传统蒸发系统体积庞大，难以高度集成，建设周期长，土建要求高。

#### DIFFICULT TO DISPOSE

Significant water quality variation, high pollutant concentration and poor biodegradability, hard to treat by conventional processes.

#### LOW TREATMENT EFFICIENCY

High COD concentration blocks membrane treatment. Traditional evaporation has low treatment depth and produces large volume of mother liquor.

#### PRONE TO SCALING WITH RAPID CAPACITY DECLINE

High water hardness causes easy scaling in traditional evaporation systems and sharp drop in treatment capacity.

#### LONG CONSTRUCTION PERIOD & STRINGENT REQUIREMENTS

Evaporator is core equipment. Traditional systems are bulky, hard to integrate, long construction period and high civil engineering requirements.

## CONSEPTEC 优势

### WHY CONSEPTEC



#### 工艺路线最短

Shortest process flow



#### 超强抗结垢性

Excellent anti-scaling performance



#### 处理量十年不衰减

Stable treatment capacity for ten years



#### 可移动撬装化设计

Movable skid-mounted design



## TREATMENT OF CONCENTRATE FROM INCINERATION POWER PLANT

### 焚烧发电厂浓缩液处理

对垃圾焚烧发电厂渗滤液进行处理，膜浓缩液预处理后采用 MVR 系统进行处置。

Treat leachate from waste incineration power plant, and dispose membrane concentrate via MVR system after pretreatment.



#### MAIN PROCESS 主体工艺

DTRO 膜浓缩 + 低温负压板式 MVR+RO  
Pretreatment + Low-temperature Negative Pressure Plate + MVR + RO

#### PROJECT HIGHLIGHTS 项目亮点

系统运行稳定，运行成本低，产水水质达标。  
Stable system operation, low running cost and qualified water output.

## LANDFILL LEACHATE TREATMENT

### 渗滤液处理

本项目对填埋场渗滤液、焚烧飞灰洗涤水、生产废水以及生活污水进行全量化处置。采用一体化除氟、除硬设备进行预处理后，进入 MVR 系统，最终产水达标排放。

This project treats landfill leachate, incineration fly ash washing water, industrial wastewater and domestic sewage. Water undergoes pretreatment via integrated defluorination and hardness removal equipment, then processed by MVR system, with final effluent meeting discharge standards.



#### MAIN PROCESS 主体工艺

除氟 + 软化 + TUF + CTRO + MVR 蒸发结晶  
Defluorination+Softening+TUF+CTRO+MVR evaporative crystallization

#### PROJECT HIGHLIGHTS 项目亮点

系统运行稳定，运行成本低，产水水质达标。  
Stable operation, low OPEX cost and qualified water output.



## OIL & GAS FRACTURING FLOWBACK FLUID & REINJECTION WATER TREATMENT

### 油气田废水（压裂反排液 & 回注水）资源化

## 油气田废水的水质特性

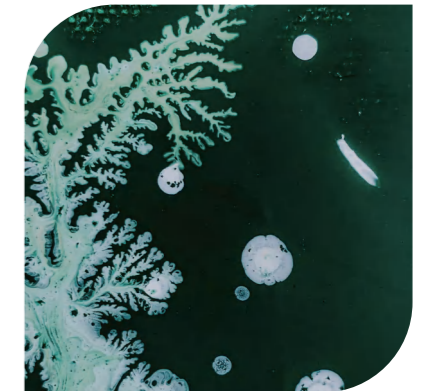
### WATER QUALITY CHARACTERISTICS OF OIL AND GAS FIELD WASTEWATER



污染物种类多  
Various pollutants



高硬度高盐度高 COD  
High hardness, high salinity & high COD



水质波动大  
Significant water quality variation

## 油气田废水处置痛难点

### WATER QUALITY CHARACTERISTICS OF OIL AND GAS FIELD WASTEWATER

水质波动大  
Great water quality fluctuation

处理要求高  
Stringent treatment requirements

处理成本高  
High treatment cost

建设成本高  
High CAPEX

设备极易结垢  
Severe scaling tendency

处理量衰减严重  
Sharp decline in processing capacity

# 油气田废水蒸发短流程资源化

## SHORT-PROCESS RESOURCE UTILIZATION OF OIL & GAS WASTEWATER

针对油气田废水处置难题，CONSEPTEC 持续创新，率先应用板式 MVR 蒸发结晶系统，油气田废水蒸发短流程资源化处置技术，达到国际先进水平。平均达标产水率≥92%，副产物结晶盐达到工业盐标准，最终走出一条全新的资源化技术路线。

Facing oil & gas field wastewater disposal challenges, CONSEPTEC keeps innovating and pioneers MVR evaporative crystallization system. The short-process recycling technology reaches international advanced level. Qualified water yield ≥92%, by-product crystalline salt meets industrial standard, forming an innovative resource utilization route.



# CONSEPTEC优势

## WHY CONSEPTEC

### 工艺流程短

采用“高效预处理 + 板式 MVR 强制循环蒸发结晶 + 稳定后端保障”三段集成工艺，设备精简，建设周期短。

### SHORT PROCESS FLOW

Adopt three-stage integrated process: high-efficiency pretreatment + plate-type MVR forced circulation evaporation crystallization + stable post-treatment, featuring compact equipment and short construction period.

### 投资成本低

核心板式蒸发器体积仅为传统五分之一，集成度高、占地小、投资省。

### LOW CAPEX

Core plate evaporator is 1/5 the size of traditional ones, high integration, small footprint and low investment.

### 处理程度高

产水经深度处理达标排放，母液低温干化无残留，适配油气田废水，稳定实现零排放。

### HIGH TREATMENT EFFICIENCY

Treated water meets discharge standards, mother liquor low-temperature drying leaves no residue, suitable for oil-gas field wastewater to achieve stable zero liquid discharge

### 实现资源化

用药少且种类单一，无新增杂质，缩减固废处理成本；可分盐产出达标工业盐，创收增效，开辟油气田废水资源化新路径。

### RECYCLING & RESTILIZATION

Less single-type chemicals used, no extra impurities, lower solid waste cost. Separated salt meets industrial standard for profit, creating new resource recovery way.

# FRACTURING FLOWBACK FLUID TREATMENT

## 压裂返排液资源化处置

应用蒸发工艺进行压裂返排液零排放处置项目，可直接出盐，具有稳定性高、处理成本低、抗结垢性能强等优势，设备清洗周期长达 1 个月。

Evaporation process achieves zero discharge of fracturing flowback fluid with direct salt production. It features high stability, low cost and strong anti-scaling capacity, with cleaning interval up to one month.



### MAIN PROCESS 主体工艺

膜浓缩 + 均质沉淀预处理 + 多效板式 MVR 强制循环 + 冷凝液 RO  
Membrane concentration + homogeneous sedimentation pretreatment + multi-effect plate MVR forced circulation + condensate RO

### PROJECT HIGHLIGHTS 项目亮点

系统运行稳定，运行成本低，产水水质达标。  
Stable system operation, low running cost and qualified water output.

# GAS FIELD PRODUCED WATER TREATMENT

## 气田采出水资源化处置

油气田废水直接蒸发处置项目，其中二期项目单套设备蒸发量达 40T/H，结晶盐达到工业盐标准，实现资源化利用。

Direct evaporation treatment project for oil and gas field wastewater. The second phase single unit evaporation capacity reaches 40T/H, and crystalline salt complies with industrial salt standards for resource recycling.



### MAIN PROCESS 主体工艺

均质沉淀预处理 + 多效板式 MVR 强制循环 + 冷凝液 RO  
Homogeneous sedimentation pretreatment+multi-effect plate MVR forced circulation+condensate RO

### PROJECT HIGHLIGHTS 项目亮点

系统运行稳定，运行成本低，产水水质达标。  
Stable system operation, low running cost and qualified water output.

# LITHIUM BATTERY CATHODE RECYCLING

## 锂电正极材料回收

由于动力电池回收行业是一个新兴行业，目前的处理方法有限，符合该行业废水特点且处理成本低、处理效率高的水处理工艺较少。

Power battery recycling is an emerging industry with limited treatment methods. Cost-effective, high-efficiency processes tailored to its complex wastewater are scarce.



### MVR 强制循环蒸发结晶

MVR 蒸发器大幅节省蒸汽，相较传统多效蒸发年省五成运行成本；湍流设计防堵塞，盐腿设计提升结晶盐品质。

### MVR FORCED CIRCULATION EVAPORATION & CRYSTALLIZATION

MVR evaporator cuts live steam consumption, saving 50% annual operating cost vs traditional multi-effect evaporation. Turbulent flow prevents clogging; salt leg improves crystal salt quality.



### 间歇式冷冻结晶

多级冷却结晶逐级降温，规避晶体挂壁，延长晶体停留时间提升粒度；小产能可选间歇式工艺，配置简易、投资低、布局灵活。

### INTERMITTENT FREEZING CRYSTALLIZATION

Multi-stage cooling crystallization avoids wall adhesion, prolongs retention time for larger grain size. Intermittent process suits low capacity with simple setup, low cost and flexible layout.



### 真空连续式冷冻结晶

连续进出料自动化运行，可稳定连续产盐；控温匀质精准把控晶体粒径，成品品质稳定，单设备占地小巧。

### VACUUM CONTINUOUS FREEZING CRYSTALLIZATION

Automatic continuous feeding & discharging for stable salt production. Precise temperature control ensures uniform crystal size, stable product quality and small floor space.

## ZERO DISCHARGE OF LITHIUM BATTERY PRODUCTION WASTEWATER

### 锂电生产废水零排放

锂电生产废水采用分质预处理 + 膜浓缩 + MVR 蒸发结晶 + 盐资源化，核心解决高氟、高重金属、高盐、含 NMP / COD 四大难题，实现水全回用、盐回收、固废减量。

Lithium battery wastewater adopts graded pretreatment + membrane concentration + MVR evaporative crystallization + salt recycling. It solves four major problems of high fluorine, heavy metal, salinity and NMP/COD, realizing full water reuse, salt recovery and solid waste reduction.



### MAIN PROCESS 主体工艺

分质预处理 (除氟 + 重金属 + COD) → 膜浓缩 (UF+NF+DTRO) + MVR 强制循环蒸发结晶 (硫酸钠体系)

Graded pretreatment (Defluorination + Heavy metal + COD) → Membrane concentration (UF+NF+DTRO) → MVR forced circulation evaporative crystallization (Sodium sulfate system)

### PROJECT HIGHLIGHTS 项目亮点

系统运行稳定，运行成本低，产水水质达标。

Stable system operation, low running cost and qualified water output.

## DEEP LITHIUM EXTRACTION FOR CATHODE MATERIAL RECYCLING

### 正极材料回收深度提锂

作为浸出净化后、沉锂精制前的关键分盐浓缩工段，实现锂与硫酸钠杂质深度分离、锂液提浓，保障高纯锂盐产出，同步副产合规芒硝，做到资源最大化回收、废水闭环零排。

As a key salt separation and concentration section between leaching purification and lithium precipitation refining, it deeply separates lithium from sodium sulfate impurities and concentrates lithium solution, ensures high-purity lithium salt production, produces qualified mirabilite by-product, and realizes maximum resource recovery and closed-loop zero wastewater discharge.



### MAIN PROCESS 主体工艺

OSLO 冷冻脱硝提锂 + MVR 强制循环蒸发浓缩提锂

OSLO Freezing Denitrification Lithium Extraction + MVR Forced Circulation Evaporation Concentration Lithium Extraction

### PROJECT HIGHLIGHTS 项目亮点

锂钠彻底分离，回收率高，锂盐纯度 ≥ 99.5%，节能环保，运行成本低。

Complete separation of lithium and sodium with high recovery rate. Lithium salt purity ≥ 99.5%, energy-saving, eco-friendly and low operating cost.

# HIGH-DIFFICULTY WASTEWATER TREATMENT FOR ELECTROPLATING, PRINTING, DYEING & TEXTILE

## 电镀 / 印染 / 纺织高难度废水处理

电镀依靠电化学工艺完成工件表面装饰防护与性能改性，镀种种类繁多，生产前后清洗、钝化等工序会产生大量废水；表面处理可提升制品防腐耐热等性能，工序耗水量大，衍生出预处理、电镀、涂装、阳极氧化等各类高浓废水，废水中含有大量的酸、碱、油类、COD、重金属离子及磷酸盐，处理难度大。

Electroplating modifies workpiece surface for decoration, protection and performance via electrochemistry. Massive wastewater generates from cleaning and passivation. Surface treatment boosts corrosion and heat resistance, consuming large water. High-concentration wastewater comes from pretreatment, electroplating, coating and anodization, containing acid, alkali, oil, COD, heavy metals and phosphate with tough treatment difficulty.

# ADVANCED TREATMENT OF HEAVY METAL-CONTAINING WASTEWATER FOR HIGH-END SEMICONDUCTOR PACKAGING & TESTING

## 半导体高端封测涉重废水深度处理

半导体高端封测配套涉重废水深度处理项目，废水中络合重金属、酸碱、高盐、氰化物等，通过膜浓缩 + MVR 蒸发设备实现最终无废水外排。

Advanced semiconductor packaging & testing heavy wastewater advanced treatment project. Containing complex heavy metals, acid, alkali, high salt and cyanide, zero discharge achieved via membrane concentration and MVR evaporation equipment.



# ANODIC WASTEWATER TREATMENT

## 阳极废水处理

阳极氧化废水强酸碱交替，PH 波动大，铝离子和氟离子含量高，处理难度大，通过膜浓缩 + MVR 蒸发设备实现水回用，无废水外排。

Anodizing wastewater features alternating strong acid and alkali, drastic pH fluctuation and high aluminum and fluoride ion content, posing great treatment difficulty. Water reuse and zero discharge are realized by membrane concentration and MVR evaporation facilities.



### MAIN PROCESS 主体工艺

破络预处理 + 混凝沉淀 + 深度过滤 + 膜浓缩 + MVR 蒸发结晶

Decoordination pretreatment + Coagulation sedimentation + Deep filtration + Membrane concentration + MVR evaporative crystallization

### PROJECT HIGHLIGHTS 项目亮点

水资源循环利用，大幅减少自来水采购费用，整套系统自动化运行，运维简便

Closed-loop water resource utilization cuts water procurement cost greatly. The fully automatic system features easy operation and maintenance.



### MAIN PROCESS 主体工艺

酸碱均质调节 + 混凝沉淀除铝除氟 + 深度过滤 + 膜浓缩 + MVR 蒸发结晶

PH homogenization adjustment + Coagulation sedimentation for aluminum and fluoride removal + Advanced filtration + Membrane concentration + MVR evaporative crystallization

### PROJECT HIGHLIGHTS 项目亮点

产水稳定达标，回用于生产漂洗，整套系统自动化运行，运维简便。

Stable qualified water reused for production rinsing. Fully automatic system with simple operation and maintenance.