Advanced, energy-saving and stable

Advanced, energy–saving and stable

JINLONG JIXIE GROUP

Jinlong Jixie Group

China's evaporative crystallization concentration technology leader

JINLONG JIXIE GROUP

Nanjing Jinlong Technology Co., Ltd

Anhui Jinlong Jixie Co., Ltd

Anhui Jinlong Evaporation and Energy Saving Equipment Co., Ltd

Nanjing Jinlong Evaporation and Energy Saving Equipment Co., Ltd

R&D center of the group: Zhongnan High tech Industrial Park in Jiangbei New Area, Nanjing City
Production base I of the Group: Bali, Chengnan Street, Tianchang City, Anhui Province
Production base II of the Group: Weiwu Road, High tech Industrial Development Zone, Tianchang City, Anhui Province

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Provide you with professional solutions in evaporation crystallization system
China's evaporative crystallizationcon centration technology leader

JINLONG

Jinlong Evaporation – Creating a Green Project

Company profile

Jinlong Jixie Group was established in 1998, which specializes in producing various types of evaporation, concentration and crystallization equipments, and provids overall process design and turnkey–projects such as complete equipment designing, manufacturing, installation, debugging, and training for these equipments. The Group's headquarters and R&D center are located in Jiangbei New District, Nanjing, and its production base is located in Tianchang city– which is the east gate of Anhui Province. The company has a modern manufacturing base and after–sales service center, and its products are mainly used in environmental and high salt wastewater treatment, biological fermentation, lithium new energy battery, chemical industry, pharmaceuticals, papermaking, steel, electricity, metallurgy, food industries and other fields.

The group is a national high–tech enterprise with a registered capital of 100.8 million Yuan and more than 260 employees, including more than 30 engineering professionals. The enterprise has D1 and D2 production qualifications for pressure vessels and has passed system certifications such as ISO9001–2008 quality management, ISO14000 environmental management, ISO18000 occupational health and safety management, and has passed the CE and NB certification. Relying on the strong and advanced R&D strength of scientific research institutions such as Hefei University of Technology and Nanjing Tech University, the company has always been conducting joint development tests of new products and new technologies, carrying out industrialization cooperation, and is committed to developing high–efficiency, energy–saving, safe and environmentally friendly products. At present, the following well–known domestic group companies are the strategic partners of Jinlong Jixie Group: Hunan Yuneng, Huayou Cobalt, Guizhou Yayou, Lomon Billions, CNNC Titanium Dioxide, Zhongshan Chemical Group, Wanshan Chemical Group, Caike Chemical Group, COFCO Group, CSPC, United Laboratories, Zhucheng Xingmao, Xiwang Group, etc. With the self–support import and export rights, the products are exported to Europe, America, Southeast Asia and other countries and regions.

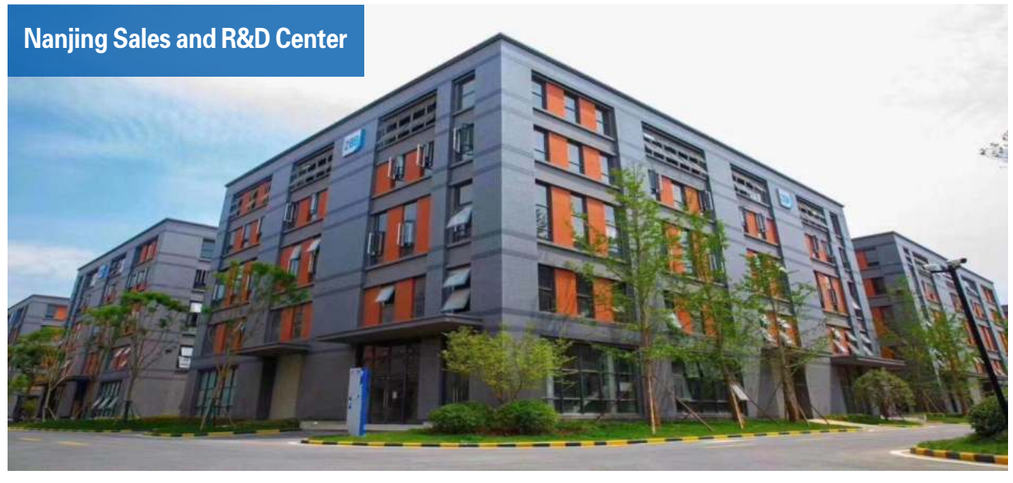
Production base I

Subsidiaries of Jinlong Jixie Group

- Anhui Jinlong Evaporation Energy Saving Equipment Co., Ltd
- Anhui Jinlong Jixie Co., Ltd
- Nanjing Jinlong Jixie Technology Co., Ltd
- Nanjing Jinlong Energy Saving Equipment Co., Ltd
- Anhui Jinlong Pump and Valve Co., Ltd

Production Base II

Nanjing Sales and R&D Center

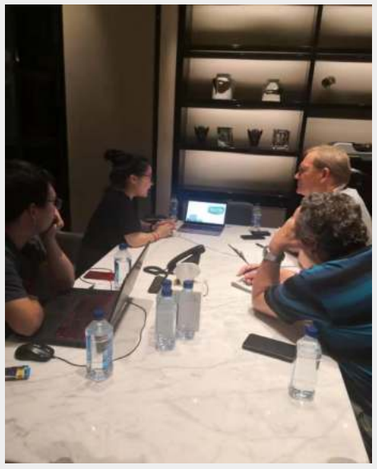


Enterprise Qualification

Honor comes from hard work, and every recognized qualification certificate embodies the hard work of Jinlong employees. Every honor is our golden business card and passport, which are our signposts and witness our journey one after another.

Technical research and development

The group has been deeply involved in evaporation and crystallization industry for nearly 20 years, with nearly a hundred senior engineers, engineers, and other professional and technical personnel. It has a sales and R&D center covers an area of more that 5,000 , collaborating with several foreign senior experts and many domestic research institutes, and has been cooperating with many well–known universities and professors to tackle key issues, and builds its own laboratories and pilot equipments. The modern water quality testing laboratory equipped by the group can customize solutions to meet the individual needs of customers, and can detect the boiling point temperature rise of the evaporated material, the evaporation crystallization state, the viscosity, COD, PH and other physical characteristics of raw material and condensed water.



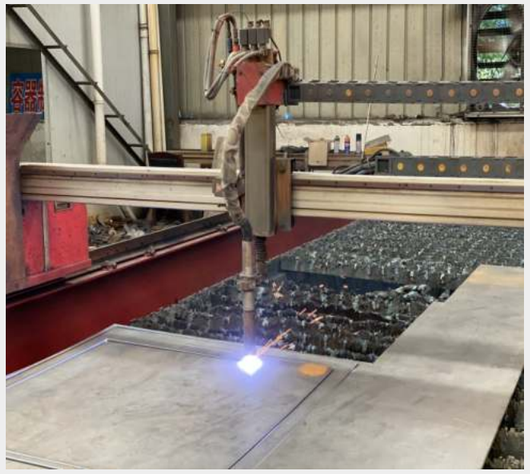
Evaporative crystallization experimental device

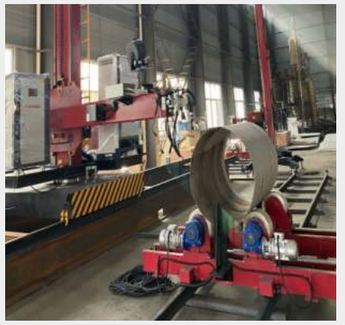
Evaporative crystallization experimental device

Evaporative crystallization laboratory

Production equipments

The company has a production base covers an area of more that 60,000m^2 , equipped with various CNC machine tools, automatic plasma cutting machines, automatic polishing machines, column type automatic plasma welding machines, automatic tube and plate welding machines, etc. With the direct participation of technical experts in production, stable, reliable, and foolproof product quality can be guaranteed.





The fields involved in Jinlong evaporation project

The company's lifting film evaporator, forced circulation evaporator, MVR evaporator, continuous crystallization, and multi effect evaporation crystallization equipment are widely used in the following fields:

Chemical industry:

- Chemical products: sodium chloride, sodium sulfate, magnesium sulfate, sodium nitrate, glycine, etc
- Chemical wastewater: sodium nitrate, ammonium sulfate, sodium sulfate, magnesium chloride, ammonium chloride, potassium chloride, sodium chloride, etc.

Lithium battery industry:

- Lithium battery materials: ternary precursor, lepidolite production, lithium sulfate, lithium hydroxide, lithium carbonate, lithium oxide, etc.
- Lithium battery wastewater: battery recycling wastewater, ferric phosphate.

Titanium dioxide industry:

- Titanium liquid concentration, continuous crystallization of ferrous sulfate
- Titanium dioxide wastewater

Pharmaceutical industry:

- Traditional Chinese medicine concentration: enzyme, sorbitol, kudzu root extract, antibiotics, licorice concentrate, etc.
- Medical wastewater

Metallurgical industry:

- Metallurgical wastewater, saline wastewater

Pesticide industry:

- Pesticide wastewater: sodium chloride, potassium chloride, magnesium chloride, ammonium chloride, sodium sulfate, magnesium sulfate, ammonium sulfate, etc.

Printing and dyeing industry:

- Printing and dyeing wastewater: sodium chloride, ammonium chloride, sodium sulfate wastewater, etc.; printing and dyeing raw material wastewater: H acid wastewater, T acid wastewater, C acid wastewater, etc.

Food and beverage industry:

- Product concentration and crystallization: alcohol, erythritol, maltose syrup, sodium gluconate acid, dairy products, hydrolyzate, etc.

Chlor–alkali industry:

- Chlor–alkali wastewater: sodium chloride, light brine, filter press wastewater, mercury waste acid water

Fermentation industry:

- Fermentation wastewater: vitamins, citric acid, amino acids, glucose, etc.

Power industry:

- Desulfurization and denitrification wastewater, sodium chloride wastewater, sodium

Categories of Jinlong evaporators

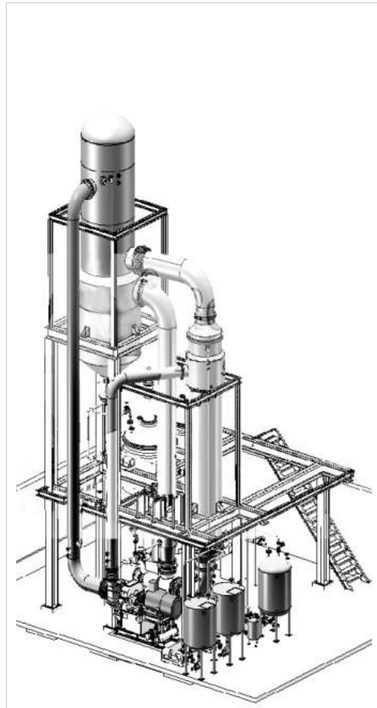
◎ MVR mechanical compression evaporator

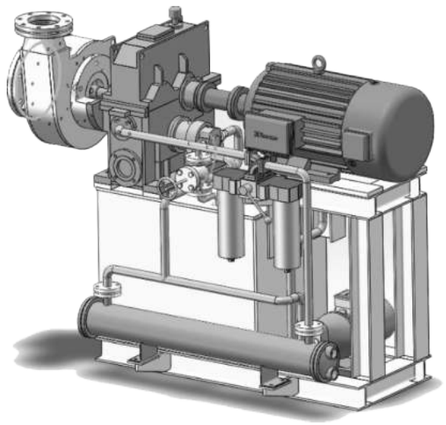
MVR is the abbreviation for Mechanical Vapor Recompression technology which is a new technology developed internationally by North America and Europe in the 1990s. The MVR technology is as follows: the secondary vapor generated by the evaporation of the liquid material is compressed by the steam compressor to increase the temperature and pressure, and causing the heat enthalpy to increase, and the vapor then enters the shell side of the evaporator to heat the liquid material on the heated side. After obtaining heat, the liquid material boils and vaporizes to produce secondary vapor, which enters the steam compressor again and is compressed and heated, thus achieving the cyclic utilization of the secondary vapor.The basic ieda is to recycle and utilize the latent heat of the secondary vapor, so as to achieve the substitution of electrical energy for steam consumption generated by coal burning.

MVR evaporation technology is widely used in many fields such as energy saving (concentration and crystallization of solution) and environmental protection (industrial wastewater treatment). MVR technology is more and more concerned and adopted by enterprises due to its high efficiency, low operating cost, reliable performance, and compact structure. The power consumption per ton of water evaporated by the MVR system is 18–60 kWh (which varies with material characteristics and processing capacity), and there is no need to supplement steam during operation. This not only saves steam but also eliminates the need for a cooling water circulation system. Compared to traditional four–effect evaporators, it saves more than 60% energy and has a running cost of one–third that of the traditional four–effect evaporators, with great energy–saving and consumption reduction effect.

Features

1、Extremely low energy consumption, the power consumption to evaporate per ton of water is 25~50kw;
2、With small heating temperature difference, the evaporation is gentle and the product loss is small;
3、With a compact layout and low construction cost, the occupied area is more than 50% smaller than that of traditional evaporators;
4、Fully automatic workflow, easy to operate;
5、Environmentally friendly, smokeless and vapor free; Low load operation with strong adaptability and high operational flexibility, long service life;
6、Low consumption of circulating cooling water and significant energy–saving effect



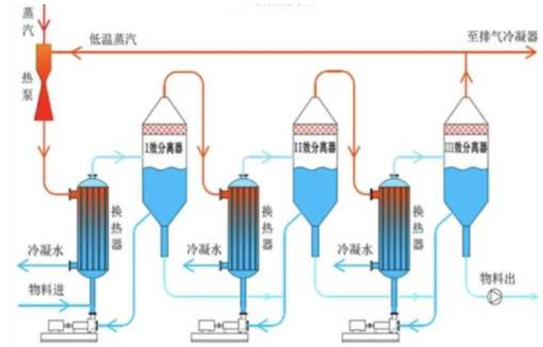


Performance comparison

In the MVR evaporation system, the secondary vapor generated from the evaporator enters the steam compressor, where its temperature and pressure are increased before being re–introduced into the evaporator as the heating steam to complete the heat exchange with the material to be processed. The exchanged steam then condenses and is discharged along with the condensed water. From the energy cycling perspective, for the MVR evaporation system, all the secondary vapor is recycled within the evaporator itself, while for the multi–effect evaporation system, the secondary steam is utilized several times for thermal energy in the next evaporator, and then cooled by circulating cooling water, resulting in some heat energy loss. Therefore, the energy–saving effect of the MVR evaporation system is significant. For the MVR evaporation system, it replaces the consumption of a large amount of heating steam (coal consumption) by supplementing a certain amount of compression work (electricity consumption). From the perspective of energy utilization, the energy consumption of the MVR system is only 1/6 of that of a multi–effect (four–effect) operation. Considering operating costs, the price ratio of coal and electricity is the main factor determining the operating expenses of the MVR evaporation system.

◎ Thermal Vapor Recompression (TVR)

TVR is a thermal vapor recompression technology (TVR). The TVR evaporator system has been improved compared to the directly exhausted secondary vapor system, which uses a jet heat pump to recover part of the secondary vapor. For jet heat pumps, only 0.3kg of 1kg high–pressure vapor can be injected, and another portion of fresh steam is needed for injection. According to the principle of heat pumps, vapor from the boiling chamber (vapor liquid separator) is pressurized to a higher pressure, at this time, the corresponding saturated vapor has a higher temperature compared to the steam in the evaporator, and the vapor can be reused. The requirement can be met by using a steam jet compressor (TVR). According to its characteristics of steam reusing, the energy saved by using a steam compressor (TVR) is equivalent to the energy saved by adding a one–effect evaporator. That is to say, it is equivalent to adding a one–effect evaporator. Therefore, it is currently widely used, however, the operation of steam compressors also requires a certain amount of fresh steam injection as power steam, which can save about 60% of energy during operation.



Product features:

1.It is necessary to have the conditions for stable supply of saturated steam with a pressure over 0.7MPa.
2.Mainly used for pre concentration of materials;
3.With low operating costs, and it is used as a mainstream process

Comparison of performance of different evaporators:

	Reaction kettle	Single effect evaporator	Multi effect evaporator	Jet pump	MVR evaporator
Energy consumption	Very high energy consumption, evaporation of 1 ton of water requires approximately 1.5 tons of steam	High energy consumption, evaporation of 1 ton of water requires approximately 1 ton of steam	Energy–saving, generally, as the efficiency increases, the energy consumption decreases	Adding one effect on the basis of traditional multi effect, however, it requires high–pressure steam to drive	The most energy–saving evaporation technology at present, only 15–50kw/h power consumption needed to evaporate 1 ton of water
Estimated cost	About 300rmb	About 200rmb	About 90–130rmb	>90～130rmb	About 15–60rmb
Floor area	Small	Small	Large	Small	Small
Impact on product quality	Long lasting time in evaporation, with serious impact on product quality.	Short lasting time but high temperature difference, has a relatively small impact on product quality.	Long lasting time and high temperature difference, have a relatively small impact on product quality.	Short lasting time, has a relatively small impact on product quality.	Short lasting time, with low temperature difference evaporation, and has the least impact on product quality.
Energy supply	Coal, diesel direct heating or steam heating	Steam heating, requires a steam pipe network and a boiler	Steam heating, requires a steam pipe network and a boiler	Semi–automatic	Electricity only, no steam pipe network is required, it is a fully enclosed circulation system
Automation level	Manual operation	Semi–automatic	Semi–automatic	Semi–automatic	Fully automatic and uninterrupted evaporation
Stability	Very poor	Relatively poor	Relatively poor	Relatively poor	Relatively good

Categories of Jinlong evaporators

◎ Falling film evaporator

Product range

According to the number of effects, there are single-effect, double-effect, three-effect, four-effect, five-effect, six-effect, seven-effect, and eight-effect evaporators.

Specifications

JLJM–XX–XX

- Number of effects (01 for single-effect, 02 for double-effect, 03 for three effect...)
- Water evaporation capacity (t/h)
- Jinlong falling film evaporator

Product description

The multi–effect falling film evaporator is a high–efficiency single cycle non–circulating film evaporation equipment, of which the film evaporation principle determines that it has the following characteristics: high heat transfer efficiency, small temperature difference loss, short heating time, less prone to deterioration, easy to operate with multiple effects, low energy consumption, small equipment size, etc. Multi–effect falling film evaporators are widely used in evaporation operations in chemical, pharmaceutical, light industry, food, petrochemical, metallurgical and other industries. The main technical indicators of the falling film evaporator produced by our company have reached the international advanced level. Our company currently produces a series of products with ten major types including single–effect, double–effect, three–effect, four–effect, and five–effect, with or without the use of heat pumps, including material of A (carbon steel), B (stainless steel for contactable materials), C (stainless steel for all structural components), and T (titanium), which are over 600 specifications. The company can undertake the task of transforming other forms of evaporators into falling–film evaporation operation types, and can equip ordinary evaporators with heating pumps to reduce steam consumption, and can provide various auxiliary equipment to match with evaporators, all of which to meet the needs of users for evaporation of various materials.

Working principle

For a multi effect falling film evaporator, the liquid is added from the upper tube box of the heating chamber of the falling film evaporator, distributes evenly through the liquid distribution and film forming device, and flows down along the inner wall of the heat exchange tube in a uniform film type. During the downflow process, the liquid is heated and vaporized by the shell side heating medium, and the generated vapor and liquid phase enter the separation chamber of the evaporator together. After sufficient separation of the vapor and liquid, the vapor enters the condenser for condensation (single–effect operation) or enters the next–effect evaporator as the heating medium to achieve multi–effect operation, while the liquid phase is discharged from the separation chamber. The principle of heat pump evaporation is that the secondary steam generated in the evaporator is pumped and compressed by a steam jet pump, and mixed with the raw steam (Or a mechanical compressor to compress the secondary steam), thus, low–grade secondary steam can be turned into high–grade heating steam for reuse, which greatly reducing the consumption of raw steam. For example, the steam consumption of single–effect heat pump evaporation can reach a dual or even triple effect level. Heat pump evaporation is especially suitable for heat sensitive materials and materials with small boiling point rise and occasions where high–pressure steam can be provided. With a slight change, the jet heat pump can also be used as a device for changing superheated steam into saturated steam.

Performance characteristics

（1）Simple and convenient operation

1.The start–up and shutdown operations of the falling film evaporator are simple and fast, and automatic control can be achieved.

2.There is very little residual material in the evaporator, and the starting up time is short. The material in the evaporator can be quickly emptied after stopping.

3.Equipped with a liquid distribution device with excellent performance, it is highly adaptable to flow changes.

4.Evaporation can be easily observed and adjusted through the sight glass and liquid level gauge.

（2）Suitable for evaporation of heat sensitive materials

1.The material can be heated and evaporated only once through the heat exchange tube, and the material is heated for a short time, which ensures the excellent quality of heat–sensitive materials by the multi–effect falling film evaporator.

2.Under vacuum operation, the evaporator can more reliably ensure the quality of heat sensitive materials.

（3）Strong applicability

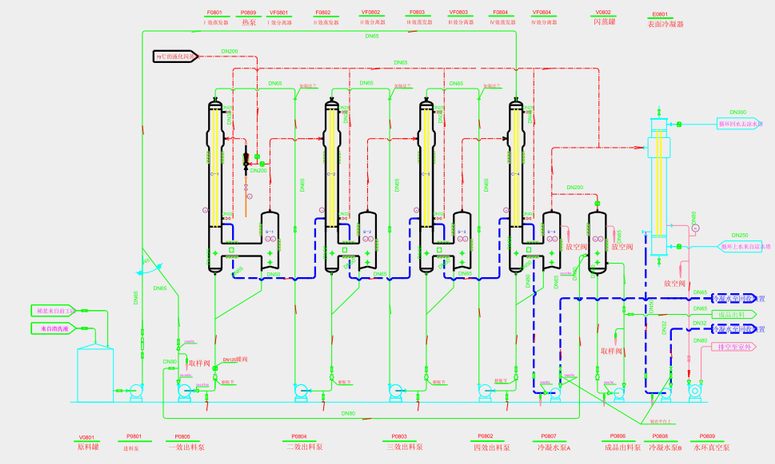
1. Suitable for the evaporation operation of most media and the crystallization operation of low viscosity media.

2.The evaporation temperature requirements of different media can be met by conveniently adjusting of the evaporation temperature.

（4）Low energy consumption, easy to achieve multi effect operation

The temperature difference loss of falling film evaporation is small, there is no boiling point increasing caused by hydrostatic pressure, and high heat transfer coefficient can still be guaranteed under small temperature difference (It can also operate normally and efficiently under the temperature difference of 5~7 ℃), so it is easy to achieve multi effect operation under the condition of a certain total temperature difference, so as to reduce steam consumption.

Flow diagram



Categories of Jinlong evaporators

◎ Forced circulation evaporator

Product range

According to the number of effects, there are single-effect, double-effect, three-effect, four-effect, five-effect, six-effect evaporators.

Specifications

JLQZ–XX–XX

- Number of effects (01 for single-effect, 02 for double-effect, 03 for three effect...)
- Water evaporation capacity (t/h)
- Jinlong falling film evaporator

Product description

For a forced circulation evaporator, it relies on an external circulation pump to circulate the liquid, and there are two structures for the heating chamber: horizontal and vertical. The liquid circulation speed is adjusted by the pump. There are several types of forced circulation evaporators: single–effect, double–effect, three–effect, four–effect, and multi–effect forced circulation evaporators. The forced circulation evaporator vacuum concentration equipment is an efficient and energy–saving equipment developed and developed by our company, which operates under vacuum and low temperature conditions, and has the characteristics of fast flow rate of liquid material, fast evaporation and not easy to scale. According to the positions of the inlet and outlet of the circulating liquid in the separation chamber, the evaporator can be sorted into positive and a reverse forced circulation evaporator. For the inlet position of the circulating liquid at the upper part of the outlet, it is called a positive circulation, while for the reverse, it is called a reverse circulation. Reverse circulation forced evaporator has more advantages. It relies on an external forced circulation pump to circulate the liquid, and there are two structures for the heating chamber: horizontal and vertical. The liquid circulation speed is adjusted by the pump.

Application field

This evaporator is widely used for handling of solutions which is viscous, with precipitation crystallization, easy to scale, or highly concentrated solutions, especially when operating under vacuum conditions, its applicability is outstanding. The forced circulation evaporator produced by our company is widely used in the evaporation and crystallization operation of sodium chloride, ammonium sulfate, magnesium sulfate, zinc sulfate, sodium sulfate, Sodium sulfite, sodium gluconic, cobalt chloride, gulonic acid, alkali sulfide etc.

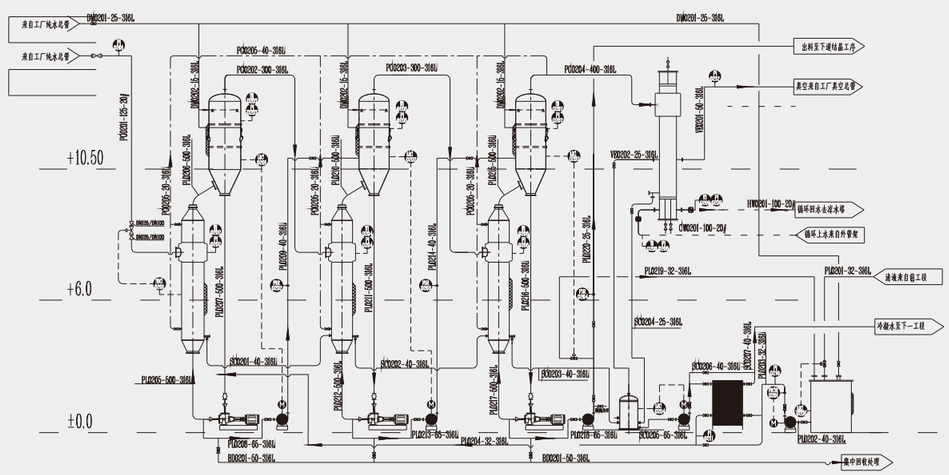
Working principle

1.Heating chamber: The heat exchange tube is the most important thermal load element of the evaporator, which directly determines the thermal efficiency and service life of the evaporator.
（1）The steam enters the heating chamber through multiple channels, which is special designed by our company to effectively avoid the impact of high–speed steam flow on the heating tube.
（2）The evaporation tubes are evenly distributed on the tube plate, improving the thermal efficiency of the steam.
（3）Special devices are installed inside the heating chamber, which effectively overcomes the vibration of the evaporation tubes and prolongs the steam residence time, which is beneficial to heat transfer.
（4）Non–condensable gases in the heating chamber can be discharged.
2.Evaporation separation crystallization chamber: The evaporation chamber is an upright cylinder with a conical bottom to facilitate the discharge of crystal slurry. The secondary vapor is discharged from the top, and enters the vapor–liquid separator after being demistered by the demister, and then enters the condenser. The conical bottom of the evaporation chamber is connected to the circulating pump.
3.Demister: The main function is to prevent the fine droplets formed during the evaporation process from being carried and escaped by the secondary vapor. Separation of vapor and liquid can reduce the loss of the liquid material, and prevent pollution of the pipelines and cooling water.
4.Forced circulation pump: It is a specialized pump for forced circulation evaporation, which is processed based on the flow state, heat transfer efficiency, and resistance calculation requirements of the fluid in the heat exchange tube, and according to the technical conditions proposed by our company's process personnel.

Performance characteristics

1.The design of the entire system is reasonable and beautiful, the operation is stable, high efficiency and energy saving, and the steam consumption is low; the concentration ratio is large, and due to the use of forced circulation, all the viscous liquids are easy to flow and evaporate, resulting in a short concentration time;
2.With the special design, effect switching can be achieved through simple operation to adapt to the production of different products;
3.Forced circulation adopted for the evaporator, with uniform heating inside the tube and high heat transfer coefficient, it can prevent the phenomenon of "pipe blockage";
4.Forced circulation adopted for the evaporator, with uniform heating inside the tube and high heat transfer coefficient, it can prevent the phenomenon of "pipe blockage";
5.The liquid material enters the separator for further separation, enhancing the separation effect and giving the overall equipment greater operational flexibility;
6. The complete set of the equipment has a compact structure and a small floor area, and a simple and smooth layout, which represents the development direction of large–scale complete sets of evaporation equipment;
7.With a continuous feeding and discharging, the liquid level and the concentration requirement can be automatically controlled.

Flow diagram

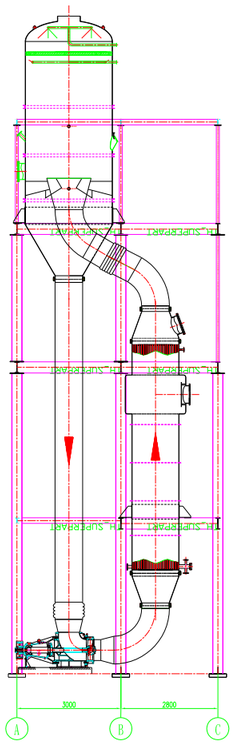


Categories of Jinlong crystallizers

◎ Forced circulation (FC) crystallizer

The forced circulation crystallizer, also known as the growth type crystallizer, has a conical bottom in the crystallization chamber. After discharged from the conical bottom, the crystal slurry is pumped to the heat exchanger through the circulation tube with an axial flow circulation pump, and then enters the crystallization chamber again after being heated or cooled. This cycle is endless and belongs to the crystal slurry circulation type, which can be operated continuously or intermittently.

Vapor recompression (thermal TVR or mechanical MVR) can also be used. Forced circulation crystallizers can operate from low vacuum to atmospheric pressure. Usually, this kind of devices are used in situations where high evaporation rates and crystal size are not the most critical or where the requirements to the crystal growth rates are moderate. It is suitable for the production of sodium chloride, barium chloride, potassium chloride, urea, sodium hypophosphite, sodium sulfate, ammonium sulfate, citric acid and other inorganic and organic crystals, with product particle sizes ranging from 0.01 to 1mm.



Forced circulation (FC) crystallizer

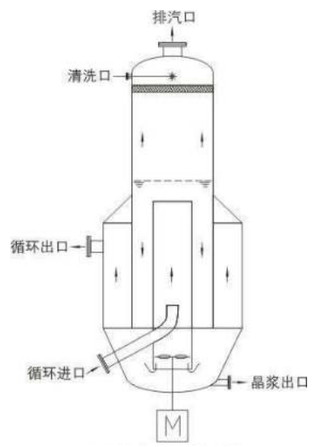
◎ DTB guide tube crystallizer

The DTB type crystallizer is suitable for mixed suspension products and is a turbulent crystallizer with flow tubes and baffles. It is a typical modern industrial continuous crystallizer with a wide range of applications. Whether for vacuum evaporation or vacuum flash cooling, it is an ideal continuous crystallizer. It consists of a heating chamber, an evaporation crystallization chamber, a circulating pump, a vertical axial flow pump, a crystallization zone, an evaporation zone, and a mother liquor zone.

The crystal particles are larger than the FC type, with a particle size of 0.2–1.2mm. The particles are uniform with a smooth surface. Different products have different crystal characteristics, but the particle size can be adjusted within a certain range, which is a characteristic of the DTB type crystallizers.

With a stable evaporation rate, this kind of design is suitable for situations where heating is not required or a small amount of heating is required.

It can be designed with a compact structure and low cost.

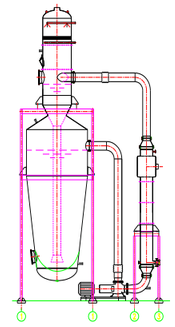


DTB guide tube crystallizer

◎ OSLO crystallizer

OSLO crystallization evaporator is a typical crystallizer commonly used in the salt industry. Due to the heating of the external heater to the circulating liquid material, the liquid enters the vacuum flash chamber and evaporates to a supersaturated state, and then went to the suspension bed through the vertical tube to allow the crystal to grow. Its main feature is that the area where super–saturation occurs and the area where the crystal grow are respectively set at two places in the crystallizer, and the crystals are fluidized and suspended in the circulating mother liquid flow, providing good conditions for crystal growth. And due to the special structure of the OSLO crystallizer, the larger particles contact the supersaturated solution first and grow preferentially, followed by the solution with smaller particle size. The products produced in this way have the advantages of larger particles and narrower range of particle size distribution, as well as the advantages of continuous operation and low labor intensity.

For the OSLO cooling crystallizer, the saturated liquid is cooled by an external cooler to reach a supersaturated state, and the liquid went to the suspension bed through a vertical pipe to allow the crystal to grow. Due to the special structure of the OSLO crystallizer, the larger particles contact the supersaturated solution first and grow preferentially. The technological process: A tubular cooler is added on the circulating pipeline, and the mother liquor circulates upwards through the tubular pipe one–way. The thick liquid is added before the circulating pump, mixed with the circulating mother liquor and cooled by the cooler to reach a supersaturated state, and then enters the crystallizer for fluidization suspension to produce large and uniform crystals with large and uniform particle size. The product (crystal) suspension is led out from the cone bottom of the crystallizer. And due to the unique structure of OSLO, the products produced have the advantages of larger particles and narrower range of particle size distribution, as well as the advantages of continuous operation and low labor intensity.



OSLO crystallizer

◎ Freezing crystallization

Cooling crystallization is suitable for substances whose solubility increases with increasing of temperature. It causes the solute to precipite by lowering the solution temperature. Generally, the higher the temperature of the solution, the greater the mass of the solute that the solvent can dissolve, and lowering the temperature will make the solute to become into a solid. The cooling crystallizer is a continuous crystallizer with mother liquor circulation, which are mainly DTB and OSLO. The crystallizer is respectively provided with a crystal growth area and a supersaturation generation area. Through this design, the growth rate of crystal nuclei is low, and the crystals continue to grow in a suspended state.

This kind of crystallizer has the characteristics of high purity, large and uniform particles.

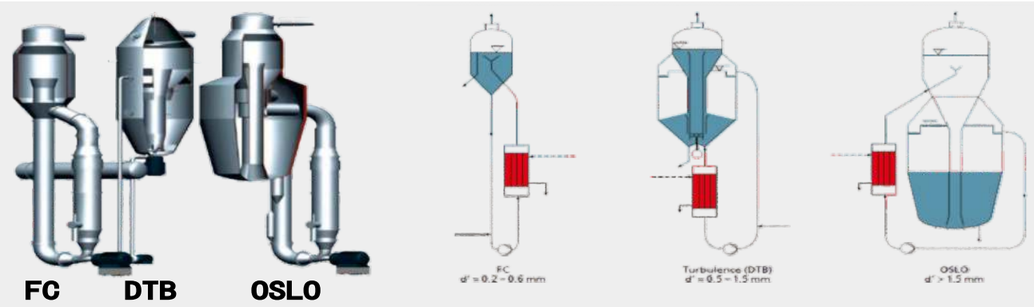
◎ Key point of the design

- Crystallization rate
- Crystallization temperature
- Particle requirements
- Solubility of materials to be processed, etc

◎ Industry Applied:

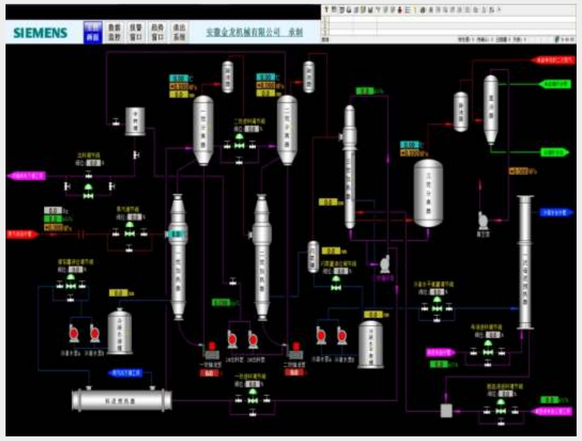
- New energy, treatment of battery recycling wastewater, lithium extraction industry
- Pharmaceuticals
- High salt wastewater
- Chemical industry
- Pesticides industry
- Food and beverage industry, etc

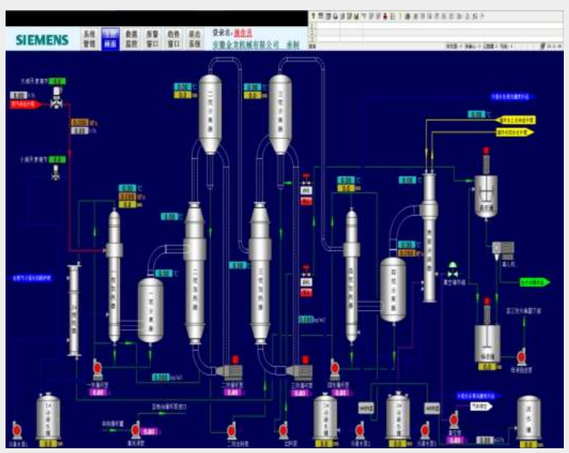
◎ Selection of crystallizers:



PLC, DCS automation control

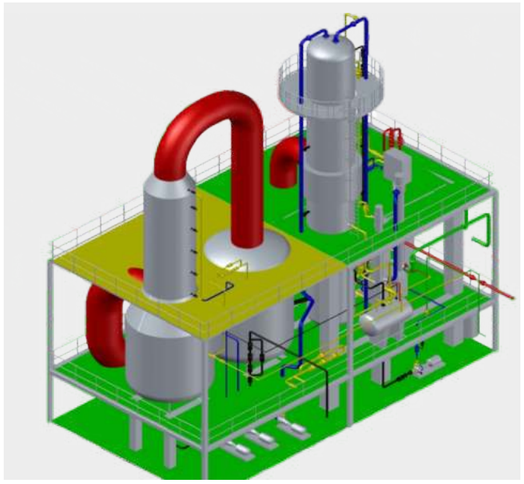
Our company's evaporation and concentration system provides customers with turnkey project from design of control scheme, model selection, programming to installation and debugging, which has fully achieved automated control. The systems can archive and record parameters such as temperature, liquid level, pressure, flow rate, etc. during the production process. Meanwhile, with the fully automatic control system, the operation status of the evaporation crystallization system can be immediately fed back to the central control room, and once the control system receiving the signal, it will immediately make adjustment to ensure the stable operation of the system.

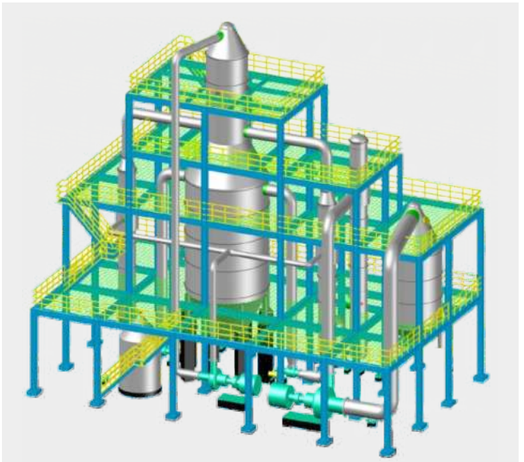


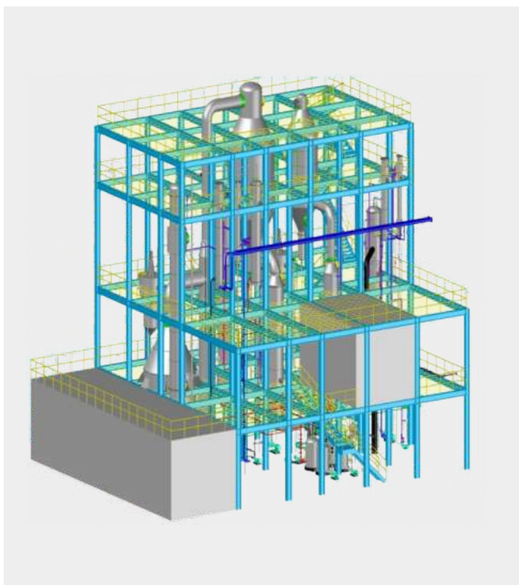


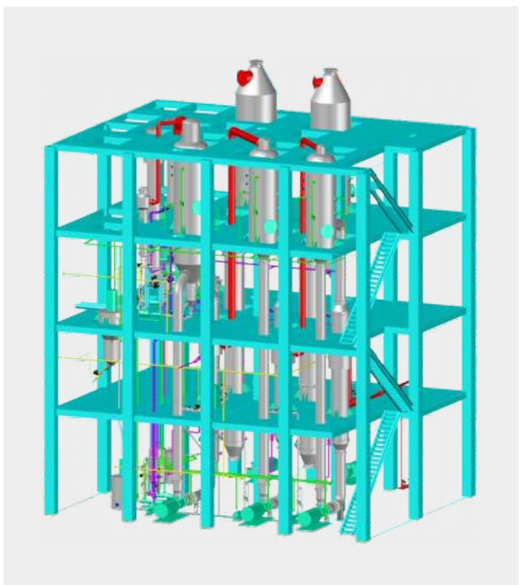
3D design

Jinlong adopts the most advanced 3D design software, which can make the system layout more scientific and reasonable, and avoid layout errors of equipment or pipelines during the installation process. Meanwhile, the 3D design can accurately reflect the material consumption and automatically generate data sheets, saving construction costs for enterprises. Through 3D design, the whole picture of the completed project can be displayed during the design stage.







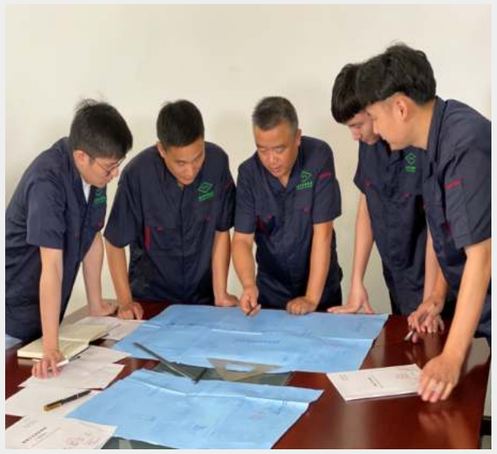


Transportation, installation, and commissioning

The evaporation equipments are designed, manufactured, and delivered to the customer's site for installation. For the delivery of ultra large equipment, it can be assembled on the project site, and Jinlong will arrange experienced engineers for guidance.

After sales service and personnel training

Jinlong has over 100 dedicated service personnel responsible for debugging, installation, and after-sales service to ensure that customer complaints can be effectively feedback within 24 hours and problems can be resolved within 48 hours! The operation of the evaporation system is relatively complex, and Jinlong will arrange experienced engineers to conduct the first time test run and provide professional training for related personnel from customer.The training content includes the following items: technical parameters and design principles of the relevant equipment, the chemical composition and characteristics of various materials, the operating methods, maintenance points, safety education, and daily maintenance points of the relevant equipment.

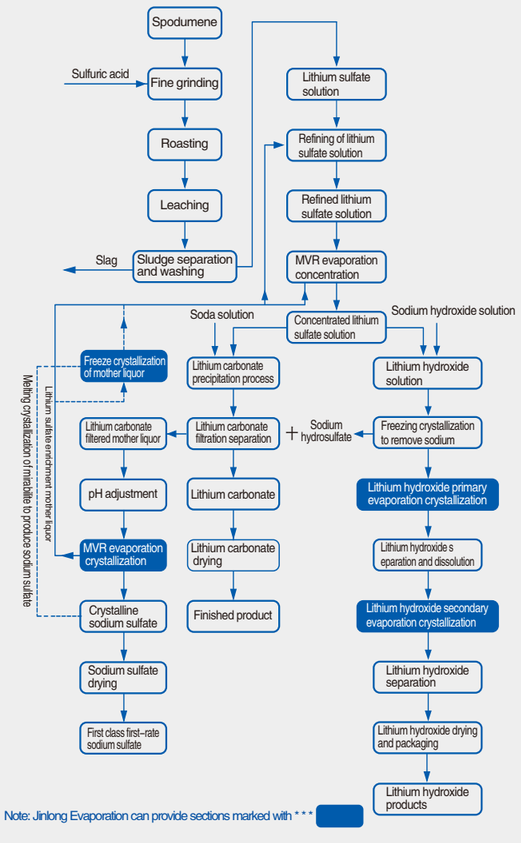


Application in the lithium battery new energy material industry

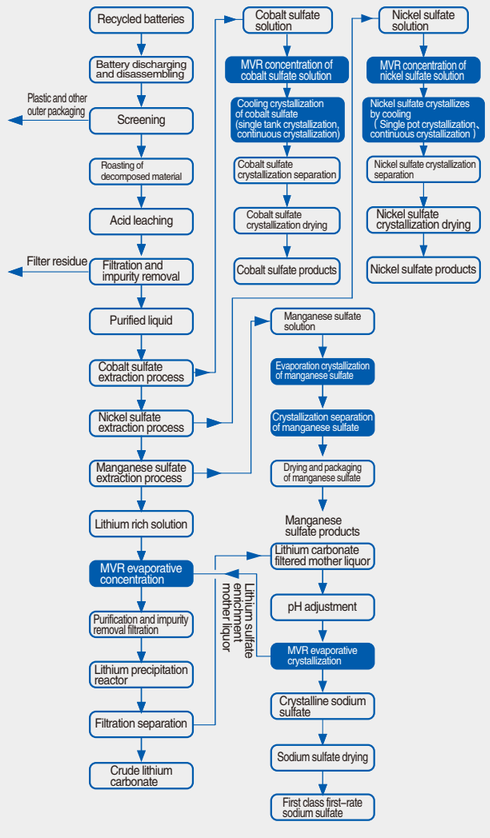
The global lithium battery demand in 2021 is 562.4GWh, and it is expected to reach 1187GWh by 2025. With the continuous heating up of the lithium battery cathode material industry, the power battery recycling industry is also in full swing. The demand for evaporation crystallization process in the industrial chain is also increasing. Relying on its rich industry experience in MVR evaporation and crystallization, Jinlong brings more optimized full-process solutions for the production and recycling industry of lithium battery cathode materials.

Process flow:

Process for producing of lithium carbonate and lithium hydroxide from spodumene and lepidolite



Ternary battery recycling process



Project example (Guizhou Tongren Jinrui Manganese Industry)

China's first high-purity manganese sulfate MVR evaporation crystallization device

Guizhou Tongren Jinrui Manganese Industry Co., Ltd., a wholly-owned subsidiary of Changsha Mining and Metallurgy Research Institute Co., Ltd., is mainly engaged in the production and sales of electrolytic manganese. In December 2017, the company launched a 100,000 ton/year manganese based new material technology renovation project. After completion of the project, the group has became a leading domestic supply base for high-quality, green, and high-end manganese based supporting raw materials for new energy materials, as well as the largest, most advanced, and best quality production enterprise in China for high-purity manganese oxide, high-purity selenium free manganese, and high-purity manganese sulfate.

Due to the influence of its physical properties, the current industrial operation of manganese sulfate crystals is mostly made by intermittent single effect reaction kettle crystallization. However, due to the intermittent production method used, its production efficiency is low, the labor intensity is high, the steam heat loss is high, the energy consumption is high and the cost is high, moreover, the quality stability of the product cannot be guaranteed. In order to apply MVR evaporation crystallization technology to the process of manganese sulfate evaporation crystallization, experts from Changsha Mining and Metallurgy Research Institute and the company's engineering and technical personnel jointly formed a research and development team. With the MVR evaporation crystallization technology, the team had find out the optimal parameters for the crystallization process of manganese sulfate monohydrate. They conducted experimental verification in continuous laboratories and industrialization, and obtained the residence time and other relevant technical data required for crystal growth during the crystallization process of manganese sulfate. After applying these data to industrial production processes, it has completely changed the problems of high energy consumption, high cost, and issue of inability to continuously crystallize that traditional processes currently have.

The 100,000 ton/year manganese based new material technical improvement project of Guizhou Tongren Jinrui Manganese Industry Co., Ltd., that is the manganese sulfate evaporation crystallization project, was undertaken by our company in September 2018. MVR evaporation crystallization process adopted for the project, which is fully automated and unmanned on site. The project was officially put into operation at the end of December 2018 with stable system operation, and the production capacity meets the design scale and energy consumption indicators.

Project example (a leading domestic enterprise)

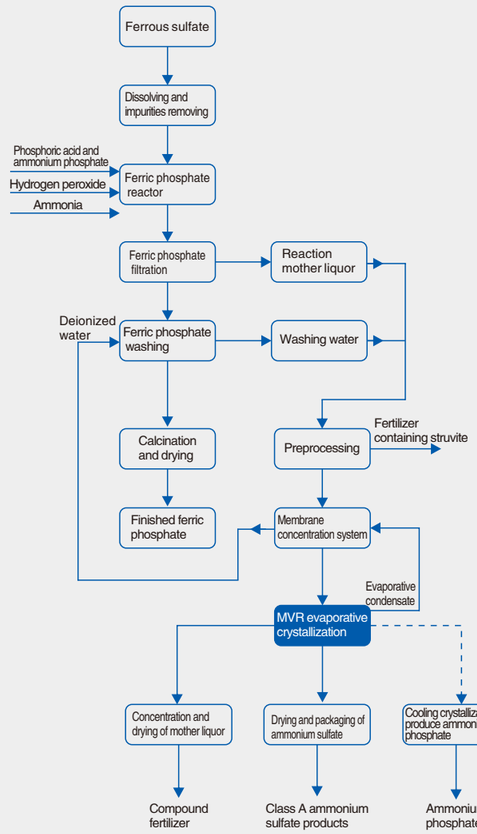
MVR evaporation crystallization device for ferric phosphate wastewater

With the strong promotion of environmental protection by the country, the new energy industry represented by lithium iron phosphate batteries is currently rapidly developing. The preparation of ferric phosphate precursors is an important link in the production of lithium iron phosphate batteries.

At present, the mainstream processes in China include ammonia method, sodium method, etc. With different raw materials in the production process, wastewater will be generated, which contains a large amount of phosphate ions, sulfate ions, iron, calcium, magnesium, and fluorine plasma, while the wastewater cannot be directly discharged.

According to the characteristics of wastewater produced in the process, the company has independently developed a membrane separation and high–efficiency MVR evaporation crystallization process technology. The technology firstly removes heavy metal ions such as ferric ion, calcium ion, and magnesium ion in the wastewater by membrane separation method, and the pure water produced after the separation is reused in production, while the concentrated water containing phosphate and sulfate enters the follow–up MVR evaporation crystallization system, and by the evaporating crystallization, the phosphate and sulfate can be separated, achieving resource reuse. The process of the system can realize fully automatic operation, which has low operating cost, and can truly achieve the goals of cost reduction, resource reuse and zero discharge of waste water.

The production process of ferric phosphate



Some projects in the lithium battery new energy material industry (nickel, cobalt, lithium, ternary precursors, ferric phosphate):

No.	Companies	Projects	Qty.
1	A New Energy Material Co., Ltd. In Yunnan	MVR Sodium Sulfate Evaporation Crystallization System	8/Sets
2	A New Energy Material Co., Ltd. In Sichuan	MVR Sodium Sulfate Evaporation Crystallization System	6/Sets
3	A New Energy Material Co., Ltd. In Guangxi	MVR Sodium Chloride Evaporation Crystallization System	5/Sets
4	A New Energy Material Co., Ltd. In Jingxi	MVR Sodium Sulfate Evaporation Crystallization System	2/Sets
5	A Titanium Dioxide New Material Co., Ltd. In Henan	Sodium Sulfate Concentration System	2/Sets
6	An Environmental Protection Technology Co., Ltd. In Hunan	MVR Ammonium Sulfate Evaporation Crystallization System	3/Sets
7	A New Energy Technology Co., Ltd. In Panzhihua	MVR Ammonium Sulfate Evaporation Crystallization System	1/Set
8	A Chemical Company In Guizhou	MVR Ammonium Sulfate Evaporation Crystallization System	1/Set
9	A New Energy Technology Co., Ltd. In Fujian	MVR Ammonium Sulfate, Ammonium Chloride Evaporation Crystallization System	2/Sets
10	A Titanium Industry Co., Ltd. In Guangdong	Ferrous Sulfate Continuous Crystallization System	1/Set
11	A Chemical Company In Inner Mongolia	Ferrous Sulfate Continuous Crystallization System	2/Sets
12	A New Material Co., Ltd. In Guangxi	Ferrous Sulfate Continuous Crystallization Concentration System	2/Sets
13	A New Energy Material Technology Co., Ltd. In Linzhou	Multi Effect Evaporation Crystallization System For Lithium Iron Sulfate And Sodium Chloride Wastewater	1/Set
14	A Manganese Industry Co., Ltd. In Guizhou	MVR Battery Grade Manganese Sulfate Evaporation Crystallization System	2/Sets
15	A New Energy Technology Development Co., Ltd. In Guangxi	MVR Ammonium Sulfate Evaporation Crystallization System	1/Set
16	A Mining Co., Ltd. In Inner Mongolia	MVR High–Purity Manganese Sulfate Evaporation Crystallization System	1/Set
17	A New Material Technology Co., Ltd. In Guangxi	MVR Crude/High–Purity/Ordinary Manganese Sulfate Evaporation Crystallization System	5/Sets
18	A Recycling Technology Co., Ltd. In Xiangyun	MVR Battery Regeneration Resource Ammonium Sulfate Wastewater Evaporation Crystallization System	2/Sets
19	A Lithium Industry Co., Ltd. In Jiangxi	MVR Sodium Sulfate Evaporation Crystallization System	1/Set
20	A Lithium Battery Material Co., Ltd. In Zhejiang	MVR Evaporation Crystallization Lithium Extraction System	1/Set
21	An Energy Technology Co., Ltd.	MVR Evaporation Crystallization Lithium Extraction System	3/Sets
22	A Technology Co., Ltd. In Zhejiang	MVR Evaporation Crystallization Lithium Extraction System	1/Set
23	A Lithium Battery Material Co., Ltd. In Guangxi	MVR Evaporation Crystallization Lithium Extraction System	2/Sets
24	A New Material Co., Ltd. In Guizhou	MVR Evaporation Crystallization Lithium Extraction System	1/Set
25	A New Material Co., Ltd. In Guizhou	MVR Evaporation Crystallization Lithium Extraction System	3/Sets
26	A Lithium Energy Technology Co., Ltd. In Shandong	MVR Evaporation Crystallization Lithium Extraction System	1/Set
27	An Energy Technology Co., Ltd. In Sichuan	MVR Evaporation Crystallization Lithium Extraction System	1/Set
28	A Circulation Technology Co., Ltd. In Anhui	MVR Evaporation Crystallization Lithium Extraction System	6/Sets
29	New Material Co., Ltd. In Anhui	MVR Evaporation Crystallization Lithium Extraction System	2/Sets
30	A Circulation Technology Co., Ltd. In Hunan	MVR Evaporation Crystallization Lithium Extraction System	5/Sets

Project example

MVR titanium liquid concentration project

The resource comprehensive utilization project of a domestic titanium industry Co., Ltd. adopts our company's MVR titanium liquid concentration system. The following table compares the costs of titanium liquid concentration MVR system of this project and the multi–effect operating.

Items	MVR falling film	Secondary effect	Single–effect rising film
Evaporation (t/h)	17	17	17
Liquid evaporation temperature in evaporator ℃	64	72/60	70
Feeding capacity m^3/h	70	70	70
Feeding temperature ℃	30	30	30
Preheating, heating, supplementary steam consumption (kg/h)	3600	11790	20681.1
Power consumption for running of MVR fan (kw/h)	780	/	/
Power consumption of material pump operation (kw/h)	88	145	135
Cooling water used for evaporation (m^3/h)	95	800	1450
Water pump power of cooling tower used for multi–effect evaporation (kw/h)	22	135	300
Fan power of cooling tower used for multi–effect evaporation (kw/h)	7.5	22	30
Unit price of steam (yuan/ton)	180	180	180
Unit price of electricity (yuan/kWh)	0.7	0.7	0.7
Unit price of circulating cooling water (yuan/ton)	0.12	0.12	0.12
MVR fan power consumption per ton of water evaporated (kw)	45.88	/	/
MVR fan electricity cost per ton of water evaporated (yuan)	32.12	/	/
Total electricity consumption per ton of water evaporated (kW)	52.45	15.92	23.47
Total electricity cost per ton of water evaporated (yuan)	36.71	11.14	16.43
Steam consumption cost per ton of water evaporated (yuan)	38.12	124.84	218.98
Total operating cost per ton of water evaporated (yuan)	75.50	141.62	245.64
Total operating cost per hour (yuan)	1283.52	2407.62	4175.90
Total daily operating cost (yuan, calculated on a 24–hour basis)	30804.48	57782.88	100221.55
Total monthly operating cost (10000 yuan/month)	92.41	173.35	300.66
Monthly energy–saving (10000 yuan/month)	80.94	0.00	0.00
Annual total operating cost (10000 yuan/year)	924.13	1733.49	3006.65
Energy saving (10000 yuan)	809.35	0.00	
Energy saving effect	**809.35**		**2082.51**

Explanation:

Compared with the two-effect falling film evaporator, the MVR evaporation has a significant energy-saving and cost reducing effect, saving 7.992 million yuan per year. While compared with the single-effect evaporator, it can save 20.63 million yuan per year.

Project example

The first vacuum continuous crystallization process of ferrous titanium dioxide in China

Based on years of crystallization engineering theory and practice, the company has introduced a continuous crystallization process of ferrous titanium dioxide in the sulfuric acid method titanium dioxide production process. This process can achieve continuous and highly automated production, which can significantly reduce production costs, save energy and increase efficiency for enterprises.

Ferrous Sulfate Continuous Crystallization System

The advantages:

1.Continuous crystallization has a high degree of automation, which can reduce the labor intensity during operation and require fewer operators.

2.Continuous crystallizers have high production efficiency, and one set of the equipment can take place of multiple sets of intermittent crystallizers.

3.With high product quality, and the time for continuous crystallization growth is longer than the current intermittent single tank crystallization, thus the ferrous sulfate crystal particles are uniform, and there is less entrainment of the mother liquor during separation, which can reduce the amount of washing water and reduce the loss caused by the entrainment of titanium from the mother liquor.

4.The equipment occupies a smaller area, which can reduce the investment for civil engineering.

Cost of intermittent single tank operation for ferrous sulfate

Items	Unit consumption (kg/ton of titanium dioxide product)	Unit price (yuan/kg)	Amount (yuan)
Steam	1161.29	0.15	174.19
Electric	60.00	0.55	33.00
Circulating water	30	0.12	3.6
合计 Total			210.79

Cost of continuous crystallization operation for ferrous sulfate

Items	Unit consumption (kg/ton of titanium dioxide product)	Unit price (yuan/kg)	Amount (yuan)
Electric	165	0.55	90.75
Circulating water	100.00	0.12	12.00
Total			102.75

Explanation:

Compared to the intermittent single tank crystallization method, the continuous crystallization system of ferrous sulfate can save about half of the operating costs.

Other projects in the continuous crystallization of ferrous iron in titanium dioxide industry and concentration of titanium liquid:

No.	Companies	Projects	Qty.
1	Lomon Billions New Materials Co.,Ltd.	60m^3/H MVR Sodium Sulfate Concentration System	1 Set
2	Gansu Oriental TitaniumIndustry Co.,Ltd.	200,000 Ton Titanium Dioxide Titanium Liquid Concentration Project	4 Sets
3	Guangdong Huiyun Titanium Industry Co.,Ltd.	40m^3/H Ferrous Sulfate Continuous Crystallization System	1 Set
4	Inner Mongolia Dadi Yuntian Chemical Co.,Ltd.	100,000TonTitanium Dioxide Ferrous Sulfate Continuous CrystallizationProject	2 Sets
5	Guizhou Sunward Fuquan Chemical Co.,Ltd	50m^3/H Ferrous Sulfate Continuous Crystallization System	2 Sets
6	Guizhou Sunward Fuquan Chemical Co.,Ltd	12.5m^3/H MVR Titanium Liquid Concentration System	2 Sets
7	Panzhihua Oriental Titanium Industry Co.,Ltd	60m^3/H MVR Titanium Liquid Concentration System	1 Set
8	Shandong Jinhai Titanium Industry Co.,Ltd.	40m^3H MVR Titanium Liquid Concentration Project	2 Sets
9	Guangxi Youcan NewMaterials Co.,Ltd	60,000 Ton Titanium Dioxide Ferrous Sulfate Continuous Crystallization Concentration Project	1 Set
10	Guangxi Youcan NewMaterials Co.,Ltd	60,000 TonTitanium Dioxide Titanium Liquid MVR Concentration Project	1 Set

Project example (Caike Chemical Group)

85.5 t/h sodium sulfate wastewater evaporation system

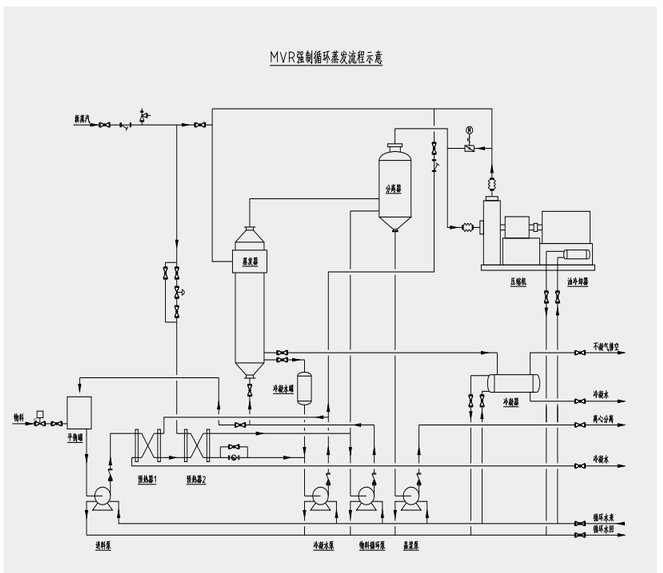
Caike Chemical Group is the largest supplier of dyes and pigment intermediates in China, during the production of the company's product DSD acid, the content of inorganic salts (sodium sulfate) in the reducing wastewater is about 30000mg/L. While the standard stipulates that the inorganic salt content in the drainage to be drained is less than 2,000mg/L, which cannot meet the discharging standard. Given the above reasons, the company has independently developed and designed a six–effect evaporation device system for evaporation treatment to remove the inorganic salts (sodium sulfate) from the wastewater.

The daily treatment capacity of DSD acidic wastewater is 2,000m3/d; The evaporation capacity of the evaporation station is 85.5t/h; The consumption of raw steam is ≤ 208kg (steam)/ton (water); And the electricity consumption is ≤ 2.83 kWh/ton of water; The automation control level is fully automatic, which can achieve one–click start, one–click shutdown, and one–click cleaning; The successful one–time test run operation of this project marks that the company's technical design has reached the international advanced level, and will make new contributions to the development of energy conservation and environmental protection!

Project example (Zhongshan Chemical Group)

Zhejiang Zhongshan Chemical Group is a global leading agricultural and chemical production enterprise, during the production process of its product triazine herbicides, a large amount of wastewater mainly containing sodium chloride is generated, while for the MVR low–temperature evaporation crystallization device, which is designed by our company can extract sodium chloride from the wastewater. The system runs smoothly and the crystallized sodium chloride can meet the standard of secondary industrial salt;
The characteristics of this process are as the followings: high–efficiency falling film evaporation method adopted for the pre–concentration, which has the advantages of low energy consumption and high heat transfer coefficient for the concentration of materials with no crystal precipitation and with viscosity less than 200cp; The evaporation crystallizer (which is external heated and forced reverse circulation with washing legs, and with axial discharging and radial feeding) is independently designed and developed by our company has the advantages of fast crystallization growth, anti scaling, and anti clogging, as well as a high heat transfer coefficient. It can achieve material discharging at high solid content without affecting the system operation.

The system adopts a PLC control system, with automatic control for temperature, pressure, liquid level, and flow rate. During normal production, the entire process can be automatically controlled, achieving the effect that the production site is unmanned.

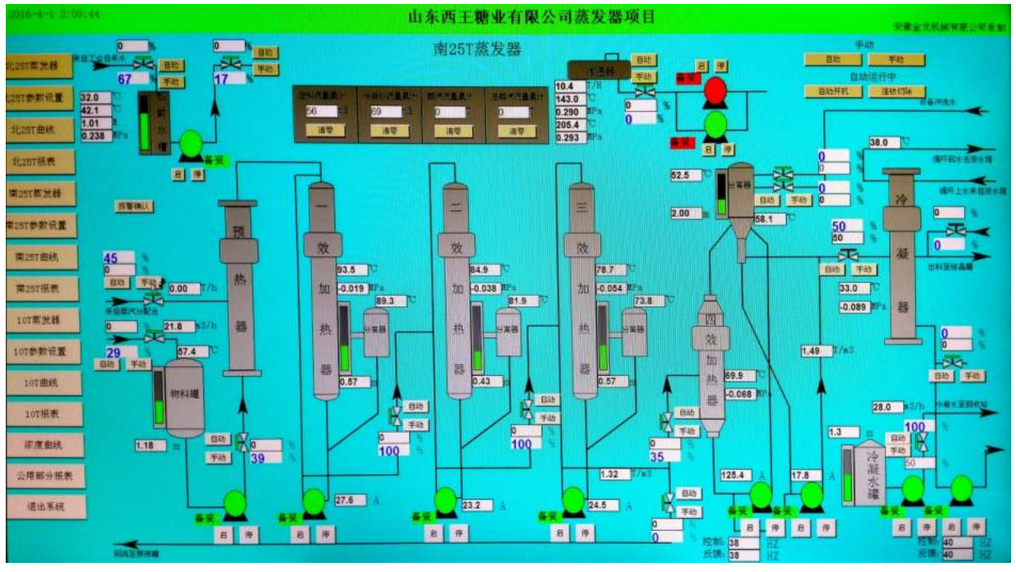


Project example (Shandong XiWang Group)

Sodium gluconate evaporation crystallization project

The key projects of XiWang Sugar Company, a subsidiary of Xiwang Group, the "Sugar Capital of China": the 25t/h*2 sodium gluconate and 10t/h sodium gluconate mother liquor projects have been officially put into operation;

The market share of the sodium gluconate evaporator, which is independently designed and developed by Anhui Jinlong Machinery Co., Ltd., is over 98%. The company has accumulated a lot of experience in the engineering practice of sodium gluconate evaporator for nearly ten years. We have applied all the experience and advantages to this project, ensuring that the project has reached the most advanced equipment manufacturing level in China and even in the world.
The technical parameters for this project to be put into operation are as the followings: unit steam consumption per ton of water is ≤ 230kg for four–effect evaporation of sodium gluconate; unit power consumption per ton of water is ≤ 6.9kw/h; The unit steam consumption per ton of water of sodium gluconate mother liquor three–effect evaporation is ≤280kg; The unit power consumption per ton of water is ≤9.75kw/h; the degree of automation control is fully automatic, which can achieve one–button start and one–button cleaning and one–button shutdown.



Other projects in the food fermentation and organic acid industry

No.	Companies	Items	Evaporation form	Evaporation capacity	Qty.
1	Shandong Kaixiang Biochemical Co., Ltd.	Sodium gluconate	Multi–effect evaporation crystallization system	25t/h	1Set
2	Yanzhou Baisheng Starch Co., Ltd.	Sodium gluconate	Multi–effect evaporation crystallization system	23t/h	1Set
3	Shandong Xiwang Sugar Industry Co., Ltd	Sodium gluconate	Multi–effect evaporation crystallization system	25t/h	2Set
4	Shandong Rundong Bioengineering Co., Ltd	Sodium gluconate	Multi–effect evaporation crystallization system	30t/h	1Set
5	Weifang Jianbao Biotechnology Co., Ltd	Sodium gluconate	Multi–effect evaporation crystallization system	25t/h	2Set
6	Hebei Yuxing Biotechnology Co., Ltd	Sodium gluconate	Multi–effect evaporation crystallization system	90t/h	1Set
7	Anhui Huanfa Biotechnology Co., Ltd	Glucose syrup	MVR evaporation concentration system	10t/h	1Set
8	Anhui Huanfa Biotechnology Co., Ltd	Maltose syrup	MVR evaporation concentration system	9t/h	1Set
9	Anhui Huanfa Biotechnology Co., Ltd	Fructose syrup	MVR evaporation concentration system	12t/h	1Set
10	Anhui Huanfa Biotechnology Co., Ltd	F55 syrup	Multi–effect evaporation crystallization system	5t/h	1Set
11	Zhaoqing Huanfa Biotechnology Co., Ltd	Glucose syrup	MVR evaporation concentration system	20t/h	1Set
12	Zhaoqing Huanfa Biotechnology Co., Ltd	Maltose syrup	MVR evaporation concentration system	17t/h	1Set
13	United Laboratories (Inner Mongolia) Co., Ltd.	Glucose syrup	Multi–effect evaporation concentration system	20t/h	2Set
14	Heilongjiang Zelong Grain Processing Technology Development Co., Ltd	Corn syrup	Multi–effect evaporation concentration system	12t/h	1Set
15	Yichang Three Gorges Pharmaceutical Co., Ltd	Valine	Multi–effect evaporation concentration system	5t/h	2Set
16	Yichang Three Gorges Pharmaceutical Co., Ltd	Isoleucine	Multi–effect evaporation concentration system	3t/h	1Set
17	Zhejiang Guoguang Biochemical Co., Ltd	Itaconic acid	Multi–effect evaporation crystallization system	1.2t/h	1Set
18	Anhui Huaheng Biological Engineering Co., Ltd.	Alanine	Multi–effect evaporation crystallization system	2t/h	1Set
19	Anhui Xuelong Biotechnology Co., Ltd.	Aspartate	Multi–effect evaporation crystallization system	12t/h	1Set
20	Shandong Sanyuan Biotechnology Co., Ltd	Erythritol	Multi–effect evaporation concentration system	20t/h	4Set
21	Shandong Minqiang Biotechnology Co., Ltd	Arginine	Multi–effect evaporation concentration system	4t/h	1Set

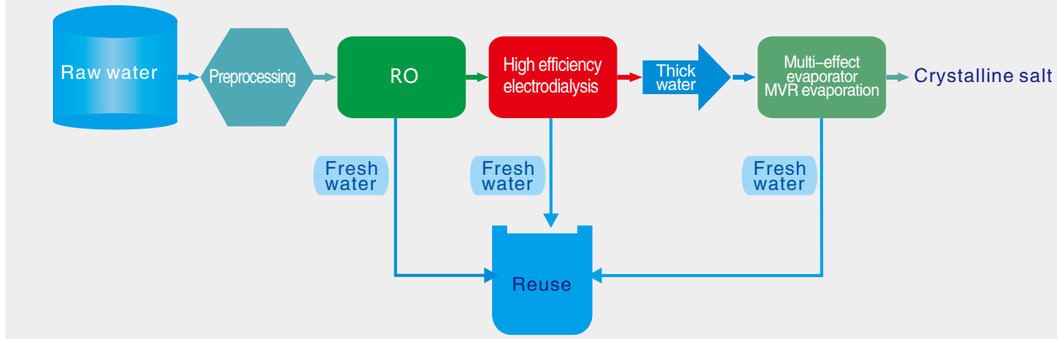
Project example (Inner Mongolia Changsheng Pharmaceutical Co., Ltd)

Application example of evaporation concentration crystallization of high–salt water

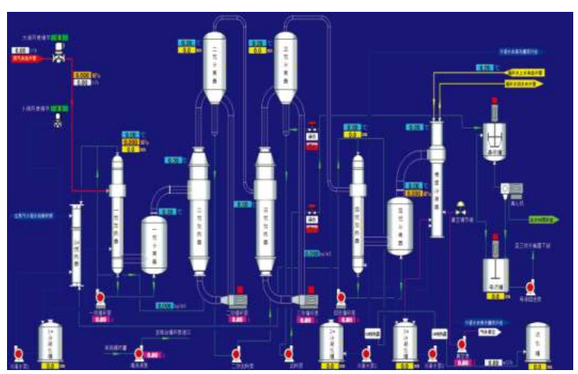
The wastewater comprehensive recycling project ––– it is the first pharmaceutical company in China that realize "Zero discharge" in wastewater purification and recycling.

Inner Mongolia Changsheng Pharmaceutical Co., Ltd. adopts the world's most advanced super reverse osmosis (SR) process to treat wastewater, completely overcoming the difficult of wastewater treatment in domestic pharmaceutical industry and realizing the recycling and reusing of industrial water. More than 99% of the wastewater can be recycled after being treated by micro–electrolysis, softening, sand filtration, ultrafiltration (UF), reverse osmosis (RO), super reverse osmosis (SR), evaporation crystallization (MED), etc. The water treated by super reverse osmosis technology is clear and transparent without any color or smell. The main indicators such as COD, ammonia nitrogen, pH, and conductivity of the recycled water meet the standards for industrial reuse water (GB–T 19923–2005, "Quality of Industrial Water from Urban Wastewater Reuse"); The salt in the sewage can be recycled and reused through the integrated operation of evaporation–crystallization–centrifugation. The evaporation crystallization (MED) system in the above process is designed, manufactured, installed, commissioned and delivered by our company. The evaporation crystallization (MED) system in the later stage of the company's project are once again be developed and designed by our company with more advanced process technology solutions, and our company are responsible for the turnkey project of the entire system.

Typical process flow chart for the zero discharge of wastewater



The wastewater enters the RO system after pretreatment, and the RO thick water enters the high–efficiency electrodialysis (HED) system for high–level concentration, and the thick water from the high–efficiency electrodialysis system enters the multi–effect evaporation system for treatment, thereby realizing zero discharge of wastewater.



Other projects in the inorganic salt industry in the pharmaceutical and chemical industry

No.	Companies	Items	Evaporation form	Evaporation capacity	Qty.
1	Inner Mongolia Changsheng Pharmaceutical Co., Ltd	Antibiotic wastewater RO concentrated water	Multi–effect evaporation crystallization system	36t/h	1Set
2	Inner Mongolia Changsheng Pharmaceutical Co., Ltd	Pharmaceutical sodium chloride/sodium sulfate wastewater	Multi–effect evaporation crystallization system	36t/h	1Set
3	Inner Mongolia Changsheng Pharmaceutical Co., Ltd	Pharmaceutical sodium chloride/sodium sulfate/ammonium sulfate wastewater	Multi–effect evaporation concentration system	35t/h	3Set
4	Inner Mongolia Changsheng Pharmaceutical Co., Ltd	Pharmaceutical sodium chloride/sodium sulfate wastewater	Multi–effect evaporation crystallization system	40t/h	1Set
5	Hebei Guangxiang Pharmaceutical Co., Ltd	API theophylline extraction wastewater	MVR evaporation concentration	12.8t/h	1Set
6	Hebei Guangxiang Pharmaceutical Co., Ltd	API steam stripping wastwater	MVR evaporation concentration	6t/h	1Set
7	Henan Houyi Pharmaceutical Co., Ltd	Synthetic pharmaceutical sodium chloride containing wastewater	Multi–effect evaporation crystallization system	3t/h	1Set
8	Chenghe Technology Co., Ltd	Sodium chloride wastewater	MVR evaporation crystallization system	3t/h	1Set
9	Anhui Zhongshan Chemical Co., Ltd	Pesticide industry sodium chloride wastewater	MVR evaporation crystallization system	8t/h	1Set
10	Xiangshui Zhongshan Biotechnology Co., Ltd	Pesticide industry sodium chloride wastewater	MVR evaporation crystallization system	8t/h	1Set
11	Xiangshui Zhongshan Biotechnology Co., Ltd	Pesticide industry sodium chloride wastewater	MVR evaporation crystallization system	10t/h	1Set
12	Sunwin Biotech Shandong Co., Ltd.	(Carboxymethyl)trimethylammonium hydrochloride	Multi–effect evaporation crystallization system	8t/h	1Set
13	Yixing Tianshi Feed Co., Ltd	(Carboxymethyl)trimethylammonium hydrochloride	Multi–effect evaporation crystallization system	8t/h	1Set
14	Hangzhou Tianchuang Environmental Technology Co., Ltd.	Glyphosate wastewater	MVR evaporation crystallization system	38t/h	1Set
15	Guang'an Chengxin Chemical Co., Ltd	Solution extraction of ammonium chloride	Multi–effect evaporation crystallization system	8t/h	1Set
16	Hebei Caike Chemical Co., Ltd.	Pigment industry sodium sulfate wastewater	Multi–effect evaporation crystallization system	85.5t/h	1Set
17	Jiangxi (Hengtian) Textile Design Institute Co., Ltd.	Recovery of sodium sulfate anhydrous	Multi–effect evaporation crystallization system	30t/h	1Set
18	Shandong Dongjia Group Co., Ltd	Titanium dioxide ammonium sulfonate wastewater	Multi–effect evaporation crystallization system	20t/h	1Set
19	Shijiazhuang Zhongshuo Technology Co., Ltd	Cellulose salt containing wastewater	MVR evaporation crystallization system	12t/h	1Set

Other cases of Jinlong

MVR sodium sulfate wastewater evaporation crystallization system

MVR ammonium sulfate evaporation crystallization system

MVR erythritol evaporation system

Glucose solution evaporation concentration system

Aminoacetic acid evaporation crystallization system

MVR sodium chloride evaporation system

Glucose solution evaporation concentration system

Wastewater evaporation crystallization system in the lithium battery industry

MVR magnesium sulfate evaporation crystallization system

(Carboxymethyl)trimethylammonium hydrochloride evaporation crystallization system

Nickel sulfate evaporation crystallization system

Itaconic acid evaporation system

Sodium chloride wastewater evaporation system

Desulfurized wastewater evaporation system

Maltose evaporation system

Fructose evaporation system

Inositol evaporation crystallization system

Corn steep liquor evaporation system

Some partners of Jinlong

Corporate philosophy:

Jinlong Vision: To become a leader in China's evaporation and concentration industry.

Jinlong Mission: Continuously improve, bravely innovate, and strive for excellence.

Jinlong values: create value for customers, develop together with employees, and progress together with the trend

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(Ranked in no particular order)