



# ENCHEM TECHNOLOGY

| FOCUS | QUALITY | INTEGRITY |

Specially engaged in evaporation and crystallization technology.  
Design, Manufacture, Installation, Commissioning and Training.



WENZHOU ENCHEM TECHNOLOGY CO LTD

# About Us

ENCHEM TECHNOLOGY has more than 10 years of experience in the field of design, production, installation and commissioning of individual equipment and integrated system based on heat transfer technology for the food, pharmaceutical, chemical, waste treatment industries.

- MVR Evaporator
- Multiple-effect evaporator
- TVR Evaporator
- Scraper film evaporator
- Waste Heat Evaporator
- Distillation & Rectification Units

With experienced engineers, automation specialists and production team, we combine our knowledge and experience to supply optimized solution to fit your needs and expectation, and design and manufacture all equipment of good quality and high performance.

We offer the full range of services to our customers:

- Design & manufacture
- Installation & commissioning & supervision
- Documentation & qualification
- Component & spare
- After sale technical service



# MANUFACTURING WORKSHOP



# Product

0

**MVR  
Evaporator**

0

**Multiple-effect  
Evaporator**

0

**TVR  
Evaporator**

0

**Waste Heat  
Evaporator**

0

**Scraper Film  
Evaporator**

0

**Integrated  
Evaporator**

0

**Low-temp  
Evaporator**

0

**Rotary Drum  
Flaker**





A mechanical vapor recompression (thereinafter abbreviated MVR) evaporator is a evaporation and concentration equipment, recycling the secondary steam completely with compression.

## MAIN PRINCIPLE

The MVR evaporator makes use of the secondary steam produced during evaporator. After compression by the compressor, the pressure, temperature and the enthalpy of the secondary steam is increased, and it is sent to the heating chamber of the evaporator and acts as heating medium to maintain the feed liquid boiling. Thus, the waste steam is fully utilized, the thermal efficiency is improved, the demand of external heating and cooling is reduced, the energy consumption and pollution are reduced.

## SCOPE OF APPLICATION

The MVR evaporator is suitable for concentration and crystallization of various material, especially for material of small boiling point elevation and diluted material which are easy to be evaporated.

## MAIN FEATURE

1. MVR Evaporator is the international advanced evaporator, a tiny amount of live steam is required (the tiny amount of steam is required for startup, and then almost none is needed for normal operation), reduces the operation consumption and the environmental pollution.
2. Compared to the traditional evaporator, the temperature difference is smaller because the heat source is provided by the compressor, thus the evaporation is gentler, which improves the product quality greatly and reduces the scale.
3. No need of condenser or a small condenser is workable, the structure and the process flow are simple, easy to realize full automation, safe and reliable.
4. There is built-in CIP cleaning pipeline, is able to realize on-site cleaning, which is easy to operate, and free of blind spot.
5. The material is evaporated under condition of low temperature (evaporation temperature @  $50^{\circ}\text{C} \sim 100^{\circ}\text{C}$ ) and free of foam. The material is uniform and not easy to coking or denaturation.
6. The installation space of MVR evaporator is about two times that of the traditional multiple-effect evaporator, the investment cost is higher too, and operation cost is much lower.
7. In order to avoid failure of MVR caused by misoperation, automatic operation system is necessary for protecting safe operation of equipment.

## SYSTEM COMPONENT

A MVR evaporator is composed of heaters, separator (crystallizer), MVR, vacuum pump, material circulating pumps, operation platform, instrumentation and control cabinet, and pipeline and fittings.

## TREATMENT CAPACITY

Customized according to demands,  
0.1~200.0ton/hour.





**MVR Evaporator  
( Sodium sulfate )**



**MVR Evaporator  
( Ammonium sulfate )**



**MVR Evaporator  
( Landfill Leachate Treatment )**



**MVR Evaporator  
( Amino acid )**

# MULTIPLE-EFFECT EVAPORATOR



A multiple-effect evaporator is a combination of multiple sets of single-effect evaporators, the characteristic is that the exhaust steam from the previous effect is reused in the aftereffect as heating source. There are double-effect, triple-effect, four-effect and even more effects, which are selected according to the working conditions.

## MAIN PRINCIPLE

In the multiple-effect evaporator, the Effect I is heated by the live steam, and the exhaust steam from Effect I flows to Effect II and acts as the heating source, thus the live steam consumption is reduced. The total temperature difference between the heating temperature in Effect I and the boiling point in last effect, is distributed in each effect, the temperature difference between effects decreases as the amount of effect increases.

The water evaporated forms exhaust steam (called as secondary steam) is reused by multiple times, the live steam consumption is reduced, so as to achieve the purpose of energy saving.



## MAIN FEATURE

1. The multiple-effect evaporator is suitable in case there is sufficient and low-cost steam;
2. It is appropriate for concentration of solution which is of big elevation of boiling point (eg. Sodium hydroxide, calcium chloride and etc);
3. It is recommended if there are various wastewater being treated, which are big differences in physical property and need to be treated separately;
4. The process flow is adjustable based on actual condition, different evaporation process (eg. Forward flow, cocurrent flow, countercurrent flow and cross flow) can be adopted accordingly.

## SCOPE OF APPLICATION

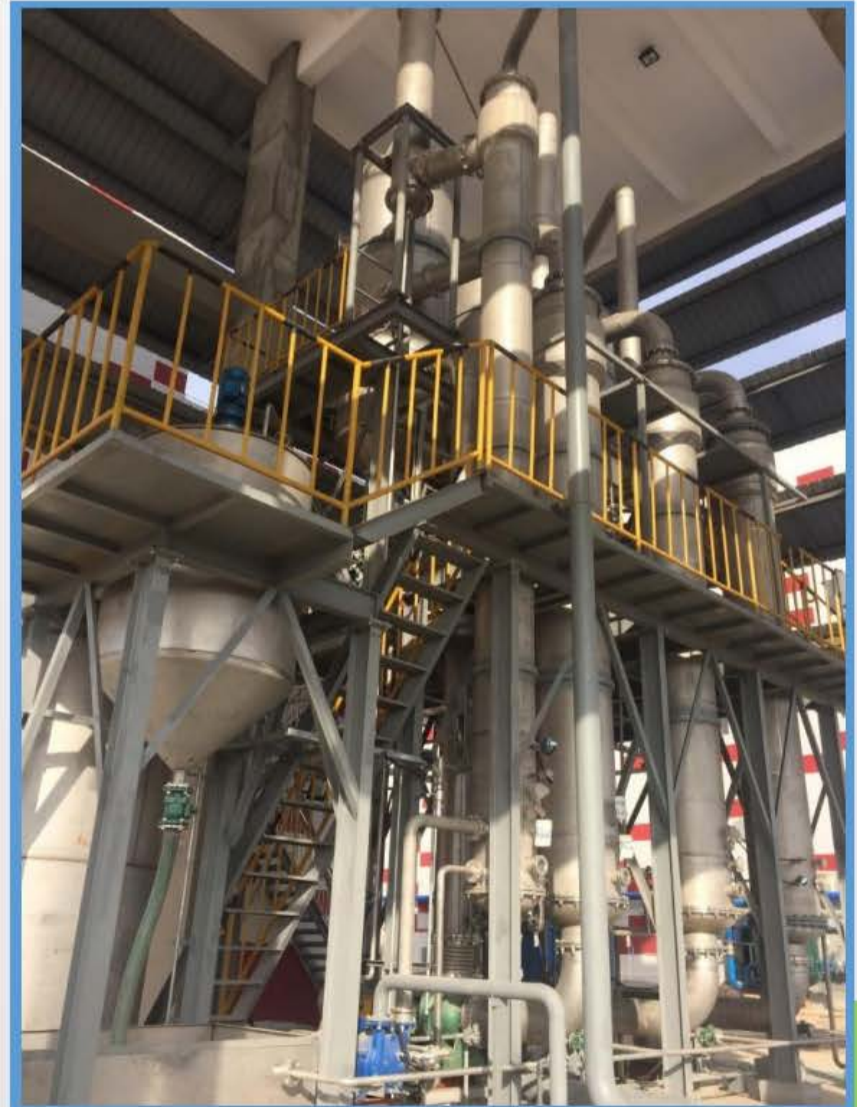
Multiple-effect evaporator is a widely used evaporation and concentration equipment applied in fermentation industry, starch/starch sugar industry, fruit juice and beverage industry, pharmaceutical industry, chemical industry and wastewater treatment.

## SYSTEM COMPONENT

A multiple-effect evaporator is composed of heaters of each effects, separator (crystallizer) of each effects, condenser, thermal compression pump, vacuum pump, material circulating pumps, operation platform, instrumentation and control cabinet, and pipeline and fittings.

## EQUIPMENT SPECIFICATION

The evaporation capacity ranges from 200kg/h to 500ton/h maximum, can be customized according to demands. And the evaporator type can be falling film type, rising film type, forced circulation type, external circulation type and etc. And the structure can be tubular type, plate type and scraper type for option.





**Triple-effect FC Evaporator  
( Cobaltous sulfate )**



**Triple-effect FC Evaporator  
( Ammonium Chloride )**



**Double-effect Evaporator  
( Calcium chloride )**



**Triple-effect Evaporator  
( Calcium lactate )**



**Triple-effect FC Evaporator  
( Wastewater Treatment )**



**Five-effect FM Evaporator  
( Glucose concentration )**



**Triple-effect FC Evaporator  
(Distiller effluent Treatment)**



**Triple-effect FM Evaporator  
( Sodium Sulphate )**



TVR (Thermal Vapor Recompression) evaporator takes advantage of thermal compression pump(Venturi) to make use of the secondary steam, thus to reduce steam consumption and achieve purpose of energy-saving.

## MAIN PRINCIPLE

After the high-pressure steam enters the thermal compression pump, high-vacuum condition is formed inside the thermal compression pump under the action of high-flow steam, sucks the secondary steam from the effect I separator to the thermal compression pump, where the secondary steam is mixed with the secondary steam. And after compression, the mixed steam enters the Effect I heater and acts as heating source.

## MAIN FEATURE

- 1.Live steam of higher pressure ( $\geq 0.5\text{Mpa}$ ) is required for the thermal compression pump;
- 2.The steam consumption reduced by a thermal compression pump is equivalent to adding one effect of evaporator, reduce the energy consumption greatly;
- 3.The thermal compression pump is free of moving part, ensures the operational reliability;
- 4.The load of the condenser is reduced because the evaporation capacity at the final effect decreases.



Waste heat evaporator makes use of waste heat from other process, which acts heat source to achieves purpose of concentration.

## MAIN FEATURE

1. In case there is dust contained in the waste heat, the dust must be removed completely before use. Otherwise, the dust would cause serious pollution to the equipment.
2. Compared with multiple-effect evaporator using saturated steam, the installation space of waste heat evaporator are 2-3 times the space of the one using steam.
3. In order to ensure the waste heat is used safely and efficiently, must learn the condition of waste heat well, including the flowrate, air content, wet-bulb temperature, dry-bulb temperature, pressure and etc.

## MAIN FEATURE

4. If there is high content of waste heat, the wet-bulb temperature is high, the investment of equipment would be lower; otherwise, the investment of equipment is higher.
5. The investment of waste heat evaporator is more than 2.5times the investment of evaporator using steam.

## EQUIPMENT SCALE

Customized according to demands,  
0.1~200.0ton/hour.



Scraper film evaporator is a new and efficient evaporator, in which, the material is forced distributed into thin film by a rotary scraper, and is concentrated under vacuum condition.

## MAIN PRINCIPLE

The material is fed through the feeding pipe, and is distributed uniformly by a distribution disc, and then is scraped by scrapers, form thin film on the heat transfer wall, and the thin film will get thinner after being evaporated. After repeated operation, the material is concentrated gradually, and the material is discharged from bottom, and the vaporized steam escapes from the steam outlet.

## SCOPE OF APPLICATION

Scraper film evaporator has characteristic of large heat transfer coefficient, high evaporation capacity, short flowing time and large operation elasticity, especially for evaporation concentration, deaerization and distillation and purification of thermosensitive materials, high viscosity materials and materials containing particles which easy to crystallization. Therefore, it has been widely used in chemical, petrochemical, pharmaceutical, pesticide, daily chemical, food, fine chemical and other industries.

## MAIN FEATURE

1. Minimal pressure loss, the material flow and the secondary steam flow are independent.
2. Operation under real vacuum condition, and the boiling point of the treated material can be reduced effectively through the improvement of the vacuum degree.
3. High heat transfer coefficient and high evaporation intensity, the heat transfer coefficient of the rotary scraper thin film evaporator can be up to  $8000\text{KJ/h}\cdot\text{m}^2\cdot^{\circ}\text{C}$ .
4. Strong adaptability, the unique structure ensures the equipment able to process difficult materials, eg. high viscosity, containing particles, thermal sensitivity and easy to crystallization.
5. Large operation elasticity, stable operation conditions, and small maintenance workload and convenient maintenance.

## SYSTEM COMPONENT

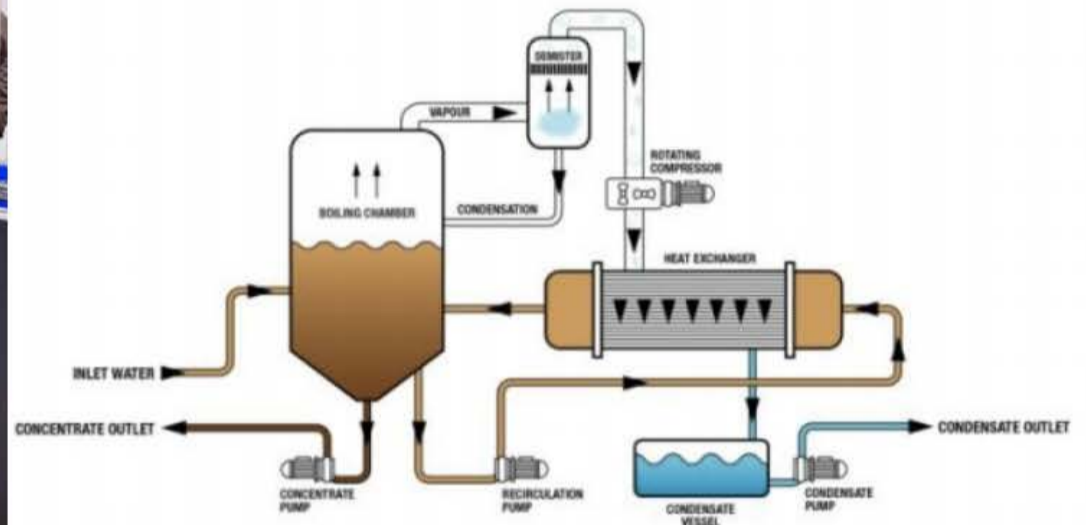
A scraper film evaporator is of motor and rotor, separating cylinder, material distributor, vapor-liquid separator, evaporating cylinder, rotor and scraper, and bottom head, and operation platform and pipeline and fittings.

## TREATMENT CAPACITY

Customized according to demands, the general heat exchange area is  $0.3\text{m}^2 \sim 20\text{m}^2$



# COMPACT TYPE INTEGRATED EVAPORATOR



Compact type integrated MVR evaporator adopts standardized, modularized, intelligent and skid-mount type design, vehicle-mounted, and has high flexibility. It is classified into two types: concentration type, is mainly used for concentration of emulsified liquid, organic wastewater and brine; and crystallization type, is mainly used for concentration of high-salinity wastewater and more complicated wastewater.

## MAIN PRINCIPLE

**Integration:** integrated equipment, can be installed and debugged before leaving factory, save time at site, can be put into use rapidly;

**Standardization:** standardized structure and spare parts, continuous improvement of overall design;

**Automation:** Push-to-start, operation with PLC, fool-style operation;

**Compact space:** the occupied area is one third of the same kind of equipment, and is moveable.

**Low operation cost:** optimized process and structure, lower the operation consumption;

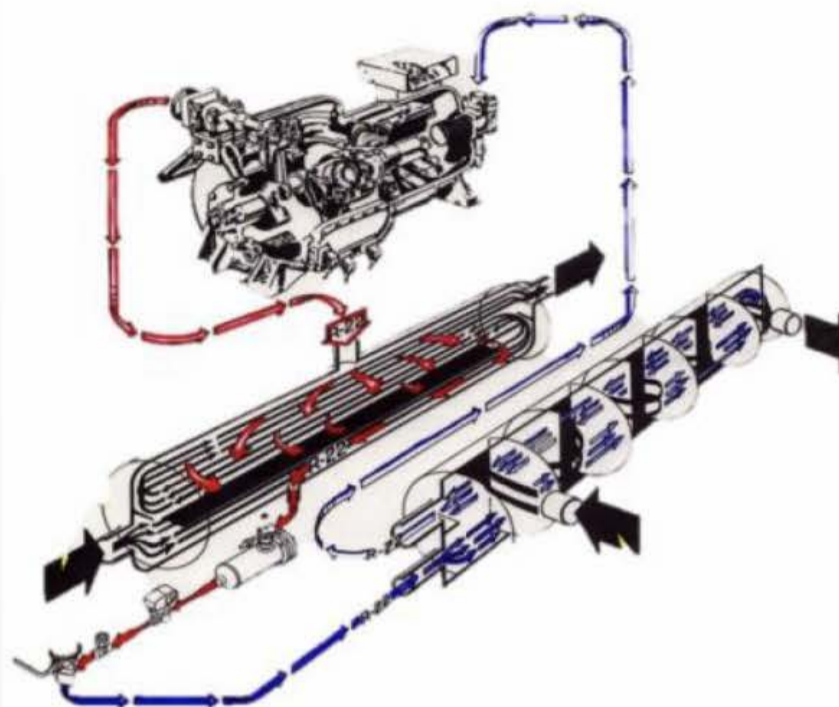
**Customization:** modular customized according to different requirements.

## EQUIPMENT SCALE

The available evaporation capacity can be 100kg/h, 200kg/h, 300kg/h, 400kg/h and 500kg/h.

The evaporation type can be falling film type and forced circulation type.





In the low-temp evaporator, the energy carrier repeats cycles of status, from vapor phase to liquor phase and from liquor phase to vapor phase, and the heat is transferred during the phase transition, the heat released is used for evaporation of feed material, and the heat absorbed is the condensation heat of the secondary steam generated from evaporation of feed material. By the use of both cold and heat of the energy, achieve purposes of concentration of feed material, evaporation and recovery of solvent.

## MAIN FEATURE

1. Small amount of industrial steam is used for startup (can be replaced with electrical heating). And no steam consumption during normal operation, realize pure electric heating.
2. The operation temperature is 40~65°C, which is adjustable according to feature of different material, is particularly applicable for concentration of thermosensitive material;
3. PLC control system is adopted, high automation and low labor intensity. The complete procedure from charging, discharging and detection and control of density, the evaporation temperature and vacuum degree can be finished automatically;

## MAIN FEATURE

4. Modular design, installed and debugged before leaving factory, can be put into use immediately after connecting with matching unit at site.

## APPLICATION FIELD

Widely used in the dehydration process of pharmaceutical, food, chemical, biologic and environmental protection industries, especially for organic solvent (flammable and combustible) .



Rotary drum flaker is used for flaking and crystallizing of liquor material, the liquor material at high temperature, flows into the flaker to be condensed into solid phase, and the large pieces of the solid material is scrapped off and become small pieces of flakes by a scraper.

## APPLICATION SCOPE

Application classification	Material for reference
Organic	Maleic anhydride, paraffins, asphalt, caprolactam, para-nitrochlorobenzene, catechol, polyvinyl acetate, TMP, etc.
Inorganic	Suplhur, sodium sulfide, rongalite, aluminum sulfate, calcium chloride, caustic soda, sodium bisulfide, etc.
Fine chemical	4010NA, 4020, RD, DTPD and other angiager; Aflux, Aktiplest, Z-80, plasticizer A, plasticizer B, and other plasticizers, etc
Grease chemical	Stearic acid and salts, fatty acid (alcohol) and salts, titanium dioxide, DMP-100, rosin titanium dioxide, palm oil, etc.
Resin	PF resin, tackified resin, terpenes resin, rosin resin, phenolic resin, polymerized rosin, epoxy resin, polyamide resin, petroleum resin C5-C9
Others	Hot melt glue, emulsion explosive, gelatine, beeswax, sodium fluosilicate, thermosetti ngmoulding material, rubber and plastic materials, etc.

## REGULAR SPECIFICATION

Model	Rotary drum specification mm	Motor kw	Rotary speed rpm	Overall dimension mm		
				L	W	H
DZ-1	400x500	2.2-3.0	2.5-12.0	1700	800	1500
DZ-2	600x600	2.2-3.0	2.5-12.0	1800	1000	1700
DZ-3	600x800	3.0-4.0	2.5-12.0	2000	1000	1700
DZ-4	800x1000	4.0-5.5	2.5-12.0	2250	1300	1700
DZ-5	800x1200	4.0-5.5	2.5-12.0	2450	1300	1700
DZ-6	1000x1000	4.0-5.5	2.5-12.0	2250	1500	2100
DZ-7	1200x1200	5.5-7.5	2.5-12.0	2450	1700	2100
DZ-8	1200x1500	5.5-7.5	2.5-12.0	2750	1700	2100
DZ-9	1500x1500	5.5-7.5	2.5-12.0	2750	2000	2400
DZ-10	1600x1800	7.5-11.0	2.5-12.0	3050	2100	2500
DZ-11	1800x1800	7.5-11.0	2.5-12.0	3050	2300	2700
DZ-12	2000x2000	11.0-15.0	2.5-12.0	3250	2500	2850
DZ-13	2000x2500	11.0-15.0	2.5-12.0	3750	2500	2850
DZ-14	2000x3000	15.0-21.0	2.5-12.0	4250	2500	2850

**Note: the above are regular model, and the dimension can be customized to adapt to the site condition.**



Enclosed type rotary drum flaker



Enclosed type rotary drum flaker complete with screw conveyor



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