

Feasibility Study on Zero Liquid Discharge of Desulfurization Waste Water

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The objective of this study was to setup a desulfurization wastewater zero-discharge pilot test equipment and conduct related wastewater treatment tests, the conclusions were as follows:

1. Regarding the ZLD pre-treatment evaluation, the test results showed that the process should consist of the film softening and concentrating function, with the heavy metal removal module retained. The film softening procedure should be multi-stage design, and the film concentration procedure can be multi-stage or cyclic design. At the final stage of the evaporation and crystallization stage, the function of ammonia recovery should be added. In addition, NF concentrated water, RO water and distilled water can be recycled as FGD feed water.
2. For the test of the zero-discharge desulfurization wastewater pilot plant, the pH of chemical coagulation was controlled at 8.5, which was conducive to the concentration of sludge, and thus the treated water flow rate was higher than 25 CMD. The membrane

system mainly contained two modules (RO and NF), with a total recovery rate of 80% and above, and the conductivity of the product water is 1490 $\mu\text{S}/\text{cm}$, qualified as raw water for power plants. The key operating parameters of thermal system evaporation and concentration were operating temperature and related pressure. Because of the salt separation effect, most of the crystals were sodium chloride.

3. In response to the gradually tightening environmental regulations, international environmental trends and the risks of environmental issues, it is necessary to continue improving environmental technology. Based on the company's zero-discharge operation experience, the relevant manufacturers' technical opinions and the evaluations of construction cost, we recommended to adopt independent/redundant use scenario and membrane concentration/ MVR treatment process as an improvement plan for the current process.

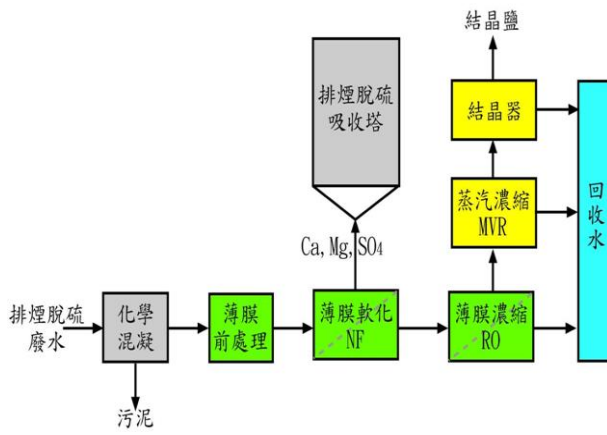


Figure 1. Pilot plant process of zero liquid discharge of desulfurization wastewater consists of chemical pretreatment, DF unit, NF unit, CIP unit, degassing membrane unit, RO unit, MVR and crystallization unit.

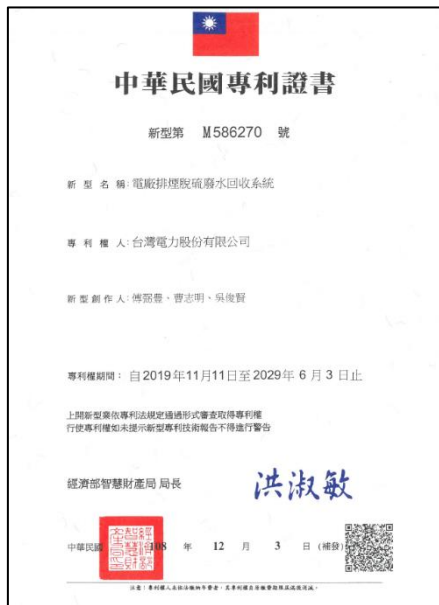


Figure 2.

The utility model patent has been approved in November 108. The process includes chemical coagulation unit, membrane pretreatment unit, membrane softening unit, chemical softening unit, membrane concentration unit, evaporation concentration unit and crystallization unit.