

# Disposal of Reverse Osmosis Reject Water for Achieving Zero liquid Discharge (ZLD)

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## ABSTRACT

Reverse osmosis (RO) Technology has been use in various industries for purity drinking water, waste water to pure water in use of industrially process. The ZLD technology are brine concentrators , conventional and reverse osmosis system . Zero liqued discharge is a best technology for solution of waste water treatment and RO reject management . Solar evaporation ponds system, machanical evaporation system , Spraying ( mist) Evaporation system , Multi effect evaporators are for disposal of RO Reject to achieving ZLD .

## Keywords

Zero liqued discharge , reverse osmosis , Evaporation , reject water , mist

## 1. INTRODUCTION

Reverse osmosis (RO) Technology has been use in various industries for purity drinking water, waste water to pure water in use of industrially process . In Reverse osmosis process are pass through the microspore in the membranes (depend quality use of membranes) then result pure water called the permit with low TDS and high concentrations does not pass through in membranes this high constancies water called is RO reject. Zero liquid discharge system is fully removed of water from use technology in our process (no liquid and solid). Industries pure water reuse to the recycling of water for purpose other than process, ground water recharge, irrigation. Use of pure recycled water by industries has increased sustainability due to cost of drinking water. Zero liquid discharge technology is fully disposed of RO reject and solid waste. Solid waste disposable facility is test of toxicity and applicable test for disposable process landfill side, Hazardous waste landfill. RO reject water is fully removed by various process of Achieving Zero liquid discharge. The significant industrial sector like textile drying and printing units, sugar, distilleries, tanneries, Pulp & paper, Dairy has been need special emphasis for enforcement of Zero liquid discharge (ZLD). Zero liquid discharge is applicable to industries having high COD and BOD load, colour bearing effluents, having metals, pesticide and other toxic / hazardous waste constituents achieving Zero liquid discharge (ZLD).

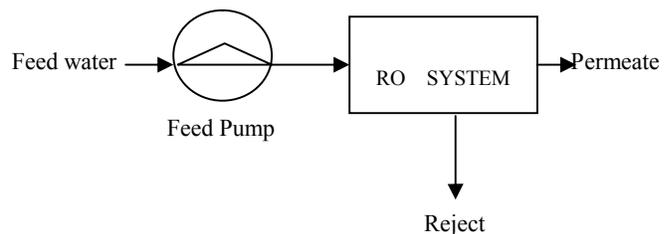


Figure 1: Reverse osmosis Process for water and wastewater treatment

## 2. TECHNOLOGIES USED IN CONVENTIONAL ZLD SYSTEMS

ZLD system involves a range of advanced waste water treatment technology to recycle ,recovery and reuse of the treated wastewater and thereby ensure there is no discharge of waste water ( liquid and soiled ) to environment

- 2.1 Ponds evaporation system
- 2.2 Mechanical evaporation system
- 2.3 Spraying ( Mist ) Evaporation system
- 2.4 Multi effect evaporators

### 2.1 Ponds Evaporation System

Pond evaporation system is a traditional process mostly effective in arid and semiarid climate having high rate evaporation. Decrease net high rate of evaporation the pond area required because evaporation occurs in less time. Evaporation net rate mostly depend on large surface area. Evaporation ponds rely on solar energy to evaporate water from the concentrate. Evaporation ponds are multiple constructed to allow continued receipt of concentrated when a pond is taken offline for periodic maintenance. The greater the flow rates of RO concentrated the larger the area required for evaporation ponds. A general guideline is to apply a factor of 7 mm to 10 mm evaporation rates. This reduces the evaporation rate by 30% to accounts for the lower evaporation rates of the concentration solution. . Factor affecting the feasibility of implementing evaporation ponds for RO concentrate disposal include membranes concentrate flow rate, geographical location (rain fall and evaporation rate) side location, cost of area, storage area. installing a double liner with leachate collection system is need to make treated reject water as lower concentrated of salt constituents than those found in the native ground water .

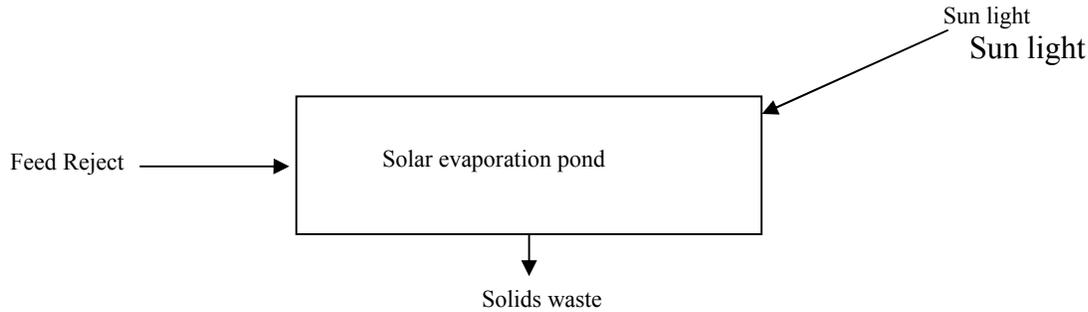


Figure 2: Pond evaporation systems

### 2.2 Mechanical Evaporation System

Crystallization is a mechanical evaporation process that uses to heat transform the concentrate waste slurry from evaporate into purified distillate and a solid product.

Crystallizers are designed to handle conations crystallization of the various dissolved salts. Waste water crystallizers are used to concentrate the effluents from brine concentrate. The most common combination of this system use for this purpose is a vertical tube falling film and RO reject high concentrator water followed to a forced circulation crystallizer.

### 2.3 Spraying (Mist) Evaporation system

Accelerated evaporation system are mostly useful in pollution control applicable by removing waste from toxic or hazardous waste are harmful water solution by in effects .

These spraying ponds are based on for evaporating water the same water is continuously re- sprayed until bulk of the water has been evaporation. The efficiency of the ponds hinges on proper pond location and layout, Pond constriction, spray nozzles, spraying pressure and water temperature. Climate condition is favourable for steam and high rate of evaporation. The area need for the ponds is directly proportional to volume of reject water and rate of evaporation. Its occupies lesser area and evaporation rate is high and other then cheaper cost of operations. These spraying (mist) evaporations system are mostly fogging type's nozzles uses.

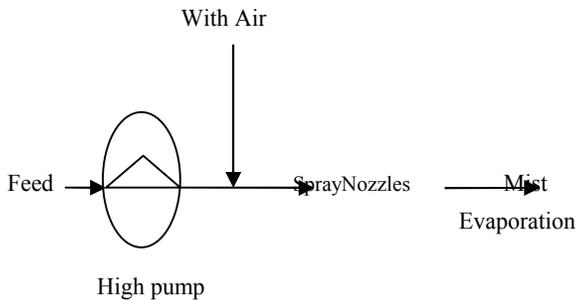


Figure 3: Spraying (mist) Evaporation systems

### 2.4 Multi Effect Evaporators

Multi effect evaporators is a process of mechanical in which essentially a heat exchanger to boiled a water to give a vapour. Water is boiled in sequence of vessels each held at a lower pressure than the last. The use of steam for further in industrial Process. Multi effect evaporators in feed are generally transferred from the one effect to another. Multi effects evaporators well establish technology for concentration up to 40% solid which can result in substantial solid waste volume reduction.

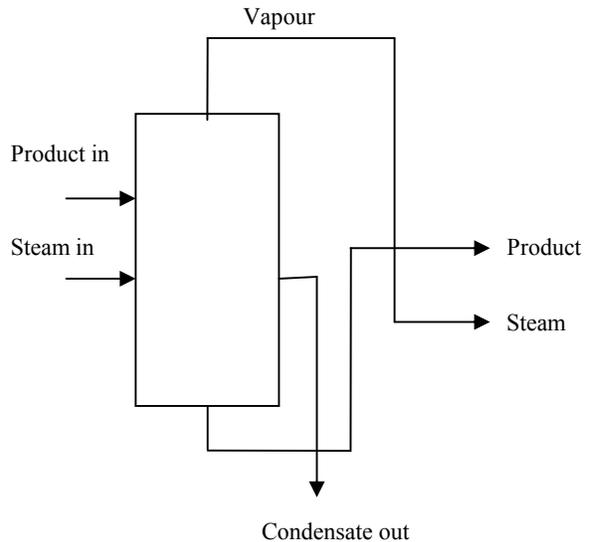


Figure 4: Multi effects evaporators

#### Advantage of Zero liquid discharge technology :

1. Zero liquid discharge is the ideal solution for brine treatment and waste water dicscharge .
2. Minimizing disposal of waste water in enviornment .
3. Saving other chemical treatment to the extent of saving in blow down water .
4. Pollution free technogly .

5. Minimize the quantity of reject and minimize the O&M of reject management .
6. Disposal of mixed salt .

### **3. CONCLUSION**

ZLD system is advanced waste water treatment technology to recycle, recovery and reuse of treated waste water. The industries requiring to achieving Zero liquid discharge system for some better Solutions for reject and salt management are achieved. This will better facilities for to reduce pollution load and reducing in quantity of effluent disposed.

### **REFERENCES**

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