

TRL RAIN TEST RUN REPORT

1-INTRODUCTION

TRL Rain is based on evaporation of water at low temperature and condensing the vapor to recover the treated water. It removes salt and other chemical from water and the condensate recover is having salt and chemical concentration to the desired level. The boiling point of water is brought down to 65 degree Celsius by creating vacuum inside the evaporator and the water starts converting into vapor, the vapor is passed through four stage condenser to obtain the treated water. Natural convection takes place between evaporator and condenser. The feed to the TRL Rain was RO-Reject of IOCL Gujarat refinery.

2-LIST OF MAJOR EQUIPMENT

TRL Rain consists of following major equipments listed below.

1. **Waste Water Storage Tank(200 Litre).**
2. **Thermic Fluid Heater.(3 Heater of 6KW-On Mode and 3 Heater of 2KW-Off Mode)**
3. **Evaporator.(Evaporation Rate of 50-60 Litr/hr)**
4. **Blower. (5 HP)**
5. **Four Stage condenser.**
6. **Filter press.(200litre/hr Capacity).**
7. **Pump(3HP capacity running on VFD)**

3-TEST RUN

A test run for two stage RO-reject was started at 11:35 AM. 500 Liter of sample was available at site to perform the test run on RO-Reject.

Step wise process as happened have been described below.

Step-1- RO- Reject was filled in the waste water storage tank. It is then transferred to Evaporator bottom through pump.

Step-2- The Thermic fluid Heater started and heated fluid was fed to the exchanger at the bottom of evaporator for heating the waste water. As the temperature of waste water reached to 65 degree Celsius the water started evaporating. The waste water at 65 degree Celsius was pumped at the top of evaporator through pump and water vapor was sucked by blower and the liquid water came down at the bottom of evaporator. This cycle continue throughout the process.

Step-3- The water vapor from the top of evaporator is sucked by blower and fed to the four stage condenser. Normal air and cooling water is used to condensed the water vapor.

Step-4- The sludge collected at the bottom of the evaporator is fed through a filter press and the recovered mother liquor is recycled back to evaporator and the salt generated is sent for disposal.



Thermic Fluid Heater



Four stage Condenser



EVAPORATOR



BLOWER

4-SAMPLES



RO-REJECT SAMPLE



CONDENSATE SAMPLE



TRL RAIN REJECT SAMPLE

5-TEST RESULT

1-Test Result of RO-REJECT.

PARAMETERS	RESULTS	UNITS
pH(at 25°C)	8.04	-
Total Dissolved Solid	7088.8	Mg/l
Total Hardness (as CaCO ₃)	3100	Mg/l
Total Suspended solid	754.8	Mg/l
Calcium	400	Mg/l
Calcium Hardness(as CaCO ₃)	1000	Mg/l
Magnesium	510.5	Mg/l
Magnesium Hardness(asCaCO ₃)	2100	Mg/l
Chlorides (as Cl)	2544	Mg/l
Sulphate (as So ₄)	651	Mg/l

2-Test Result of Condensate.

PARAMETERS	RESULTS	UNITS
pH(at 25°C)	6.96	-
Total Dissolved Solid	81.25	Mg/l
Total Hardness (as CaCO ₃)	40	Mg/l
Total Suspended solid	<5	Mg/l
Calcium	4.0	Mg/l
Calcium Hardness(as CaCO ₃)	10	Mg/l
Magnesium	7.2	Mg/l
Magnesium Hardness(asCaCO ₃)	30	Mg/l
Chlorides (as Cl)	48.93	Mg/l
Sulphate (as So ₄)	<5	Mg/l

3-Test Result of Reject from TRL RAIN

PARAMETERS	RESULTS	UNITS
pH(at 25°C)	7.21	-
Total Dissolved Solid	24392.4	Mg/l
Total Hardness (as CaCO ₃)	4900	Mg/l
Total Suspended solid	3852.8	Mg/l
Calcium	760	Mg/l
Calcium Hardness(as CaCO ₃)	1900	Mg/l
Magnesium	729.3	Mg/l
Magnesium Hardness(asCaCO ₃)	3000	Mg/l
Chlorides (as Cl)	11059	Mg/l
Sulphate (as So ₄)	912.6	Mg/l

6- RESULT AND DISCUSSION

The quality of treated water is meeting the required discharged standard. The parameter like TDS, Total Hardness, TSS, Chlorides and Sulphate reduced to almost 1-3% of the initial concentration. The treatment result from the TRL RAIN is satisfactory.

As Present The Maximum Capacity Available Is 250kld, As Discussed With The Vendor They Are Planning To Increase The Capacity Of TRL Rain So That It Will Treat The Whole Quantity Of Ro-Reject Produced.

The operation of the TRL RAIN is very simple and automatic and no skilled manpower is required. In addition to that TRL RAIN is compact in design and shall be accommodated at the plant where space constrain is a major problem. Also frequency of maintenance is low.