

DEEP CHARGING OF SOLAR CRYSTALLIZERS

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Whether it is a marine salt works or sub soil brine salt works, the crystallisers are the heart of the salt works. Hence its best utilization is most important for a salt works. The crystallisers should give maximum yield, best quality salt with minimum brine consumption. In this paper, stress is given for *Deep charging* which has its own benefits to make best use of crystallisers.

Many experiments were conducted by the author to compare the result of deep charging and shallow charging. The details of the experiments and observations are as under. This is one example only.

Experiment: Crystalliser 'A' charged on 9.12.96 harvested on 23.2.96

Density: 25°Be, depth of brine 25cm, recharged as per requirement to maintain the column
Production: 225 MT

Experiment: Crystalliser 'B' of the same size as 'A', charged on 9.12.96, harvested on 23.2.96

Density: 25°Be, depth of brine 8cm, recharged as per requirement to maintain the column

Production: 195 MT

Observations:

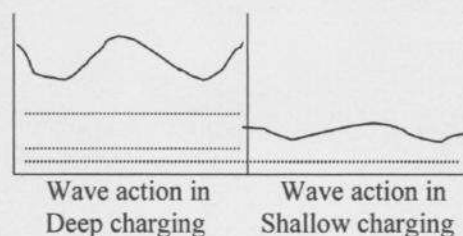
1. Temperatures of Brine

Time	10am	4 pm	10 pm	4 am
A top	18°C	25°C	22.5°C	15°C
A bottom	20.5°C	27°C	25°C	16.5°C
B top	17.5°C	25°C	22°C	13°C
B bottom	18°C	24.5°C	23.5°C	14°C
Atmos temp	16.5°C	25.5°C	23.5°C	14°C

Temperature at the bottom of 'A' is always higher by more than an average of 2°C (about 10%). This helps to increase the rate of evaporation due to absorption

of heat. Variance in temperatures of 'A' are much less as compared to 'B'. This gives better shape of crystal, which minimize impurities in magnesium salt.

2. Wave action



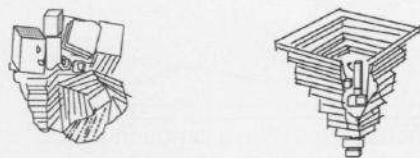
Deep charged crystallisers get much more wave actions as compared to shallow charged. This artificially increases the surface area, which again helps to increase the evaporation. The surface area increases by about 15% depending on wind velocity, direction and size of the crystallisers. The above figures show wave action in deep and shallow charged crystallisers.

3. Microorganisms

The biological system of salt works particularly of crystallisers is very important. In crystallisers it is most concentrated brine having maximum value as all cost is already incurred hence its losses by leakage of seepages is definitely erosion of salt works profit. The biological system helps to develop more algae in salt works, which in final stages in crystallisers becomes of deep red color. Higher column of brine helps in growth of microorganisms. The higher column also gives more dark color shade to brine. This helps to absorb more heat in brine; finally this increases the rate of evaporation. The microorganisms also help to seal the small leakages/seepages. Thus loss of valuable brine decreases.

4. Crystal

The shape of the crystal is very important of quality of salt in deep charging the crystals are solid, heavier and do not retain mother liquor after harvesting impurities are drained out very fast and at the time of washing also magnesium salts can be washed out very fast. Whereas in shallow charging it is just the opposite. Crystal is of hollow type, which retains mother liquor after harvesting, and it dries up inside the crystal. At the time of washing it takes longer time to remove impurities, which results in washing losses. The diagrams of typical type of crystals in deep and shallow charging are given here :



In the end, the conclusion based on the above details and experiments the yield of crystallisers increases by about 15%. The quality also improves.

A further study is to be carried out to analyze increase in production separately by

- a) Increase in temperature
- b) Wave actions
- c) Micro organisms

Such study will help to improve the yield of the salt works. A lot of work is required to be done in this field. The author takes this opportunity to thank the staff of M/s. Ballarpur Industries Limited who extended their help in the preparation of this paper.

Reference:

1. M.H. Jadhav, CSMCRI : Advantages of Deep Charging of brine in various ponds of solar salt production fields.
2. Joseph S. Davis : Biological Management of Solar Salt Works.