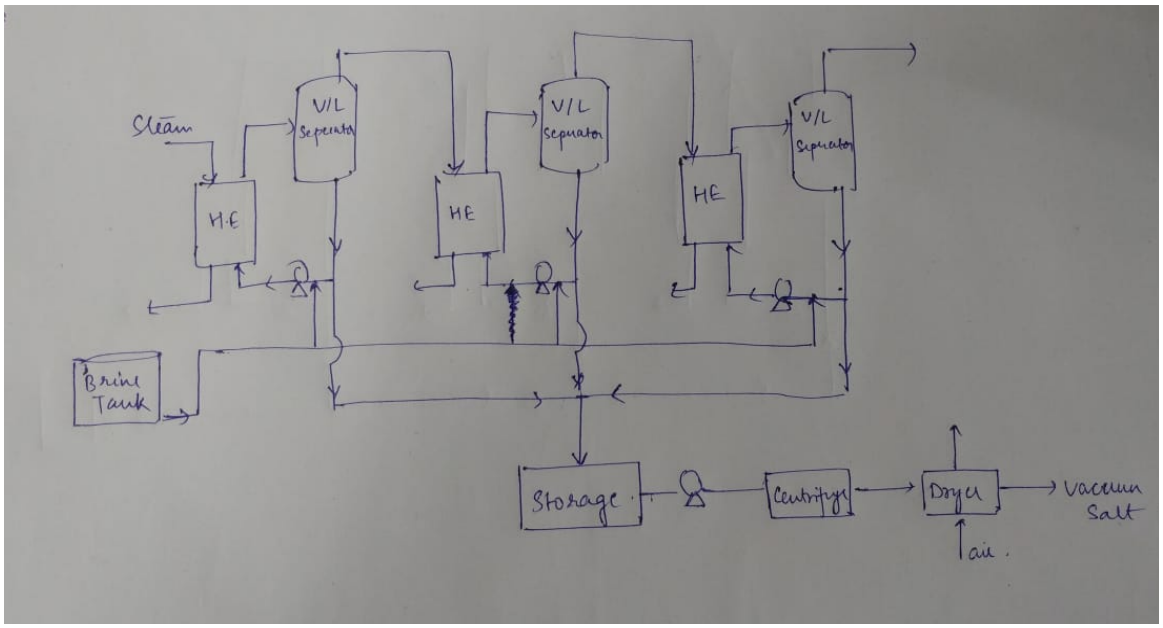
MANUFACTURING OF VACUUM SALT

ABSTRACT

BACKGROUND

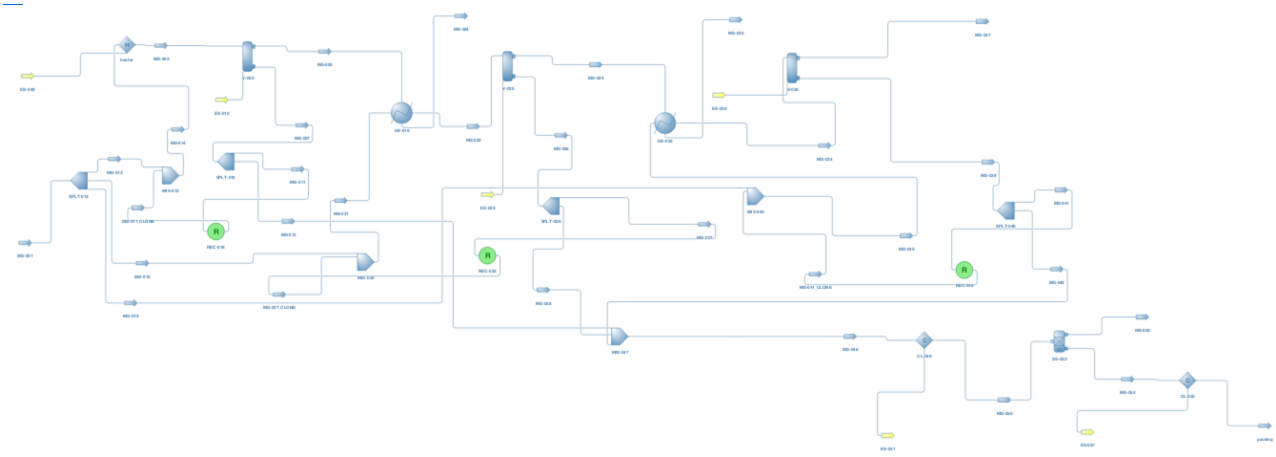
All over India, there are only 2 companies which makes vacuum salt
1) Nirma vacuum salt
2) Tata vacuum salt
The following flowsheet is the slight description of how Nirma vacuum salt is made which I saw during their industry visit.



DESCRIPTION

1) First step for the production of vacuum salt is the preparation of the brine solution that is adjusting right percentage of sodium chloride and impurities. In the flowsheet we have taken a mole fraction of sodium chloride as 0.2 and 0.8 water for simplification of the process.
2) This brine solution is passed through multi effect evaporator to separate the water and sodium chloride and increase mole fraction of sodium chloride. Here special type of MEE is used in which fresh feed is supplied to all the 3 stages of the MEE unlike in normal MEE in which fresh feed is passed through only 1 stage of MEE.
3) Steam is fed to the first stage as a heating medium which passes through a counter current calandria through which it is flashed at lower pressure so that water goes out as vapour and concentrated solution of NaCl is left. The final mole fraction we got after passing through MEE is 0.4013 of NaCl.
4) Which is then sent to centrifuge and dryer where water is removed 100% and we get vacuum salt. While doing simulation due to unavailability of dryer a solid liquid separator unit is used to get final vacuum salt.

Following is the flowsheet of the above process made in DWSIM:



RESULTS

Pressure and temperature of 1st effect is 55000 Pa and 385 K: Mole fraction achieved (NaCl): 0.579

Pressure and temperature of 2nd effect is 40000 Pa and 365 K Mole fraction achieved (NaCl): 0.4685

Pressure and Temperature of 3rd effect is 30000 Pa and 350 K Mole fraction achieved (NaCl): 0.2869

Final mole fraction of NaCl after mixing all above streams: 0.4013