DESIGN OF INDUSTRIAL OSLO CRYSTALLYSER A CASE STUDY

NINANE, Consultant

Engineer Physics , Belgium

Ms Chem Eng , US,

Email: leon.ninane@hotmail.fr

Lab development

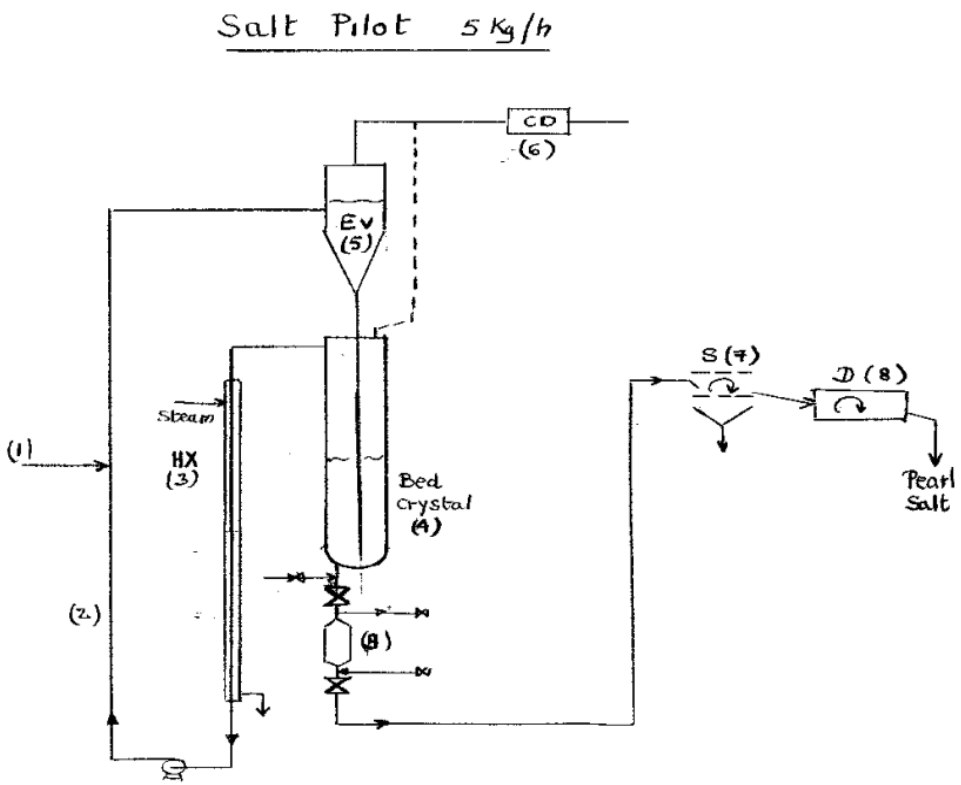
- Determination rate of growth versus super saturation and dependence on temperature
- Band width of meta stable area and limit of homogeneous super saturation
- Practical super saturation; for NaCl = 0.5 g/kg

Limit of crystallization of impurities :

$CaSO_4$, $CaSO_4.Na_2SO_4$, …

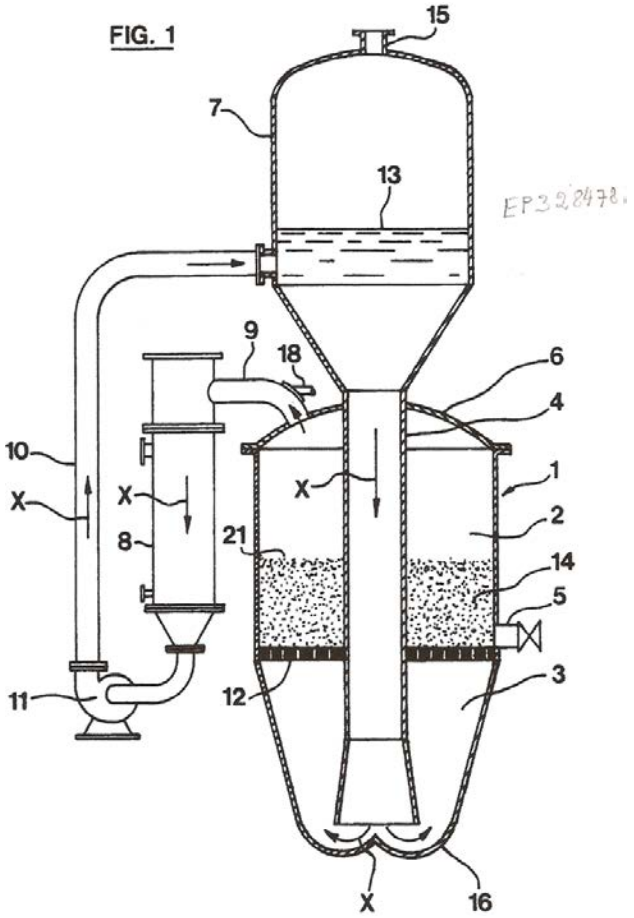
- Control by Ca purification of brine or purge based on economics

Pilot



Capacity : 5 kg/h
Rising velocity=200-400m/h
Polished surface
Hydrodynamic
Extraction production
Seeding
Control of nucleation

Industrial Plant



Size

Diameter 5 m

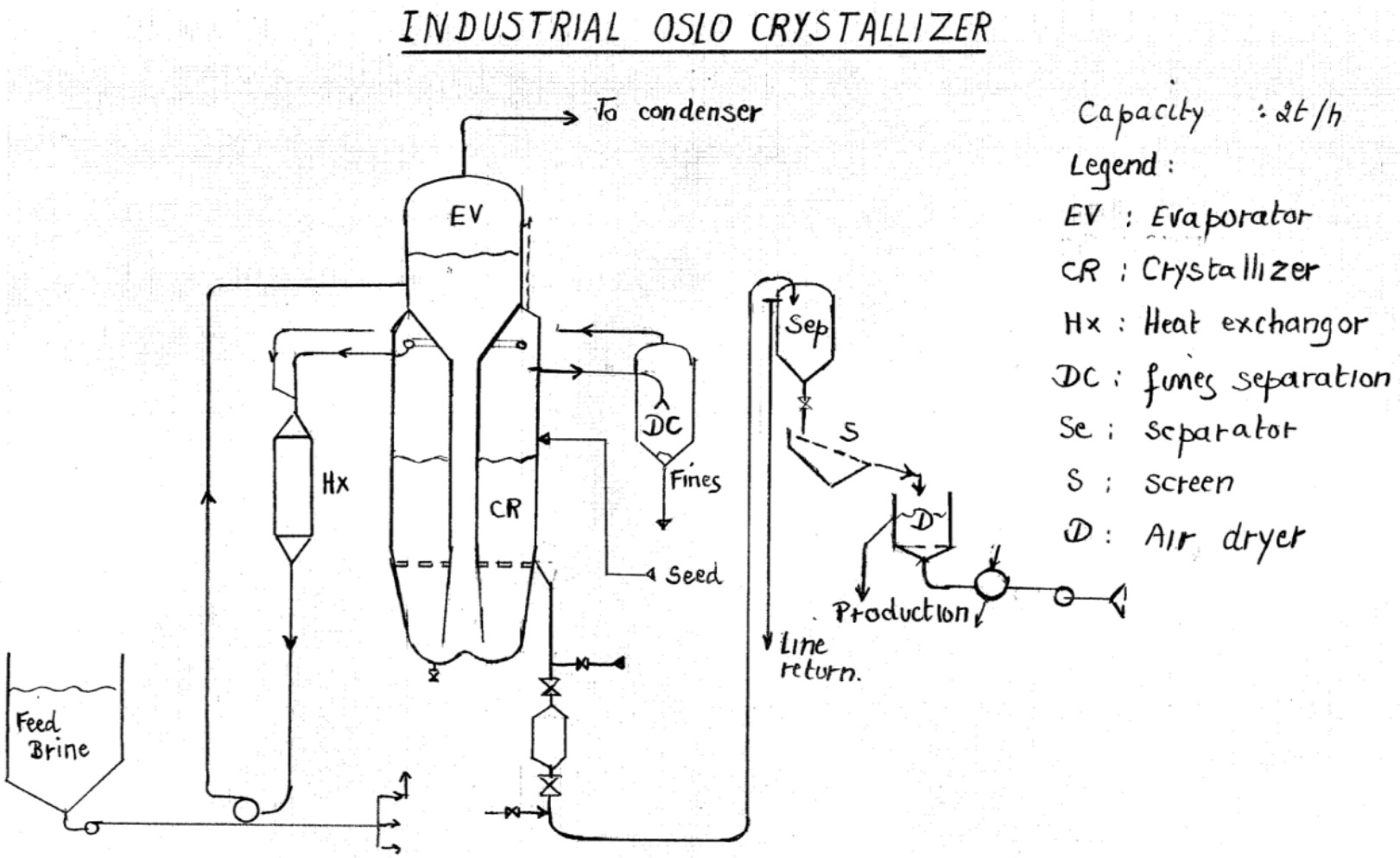
Height CR 20 m

Weight salt 25 t

Flow rate 4000 m3/h

Heated distribution plate

Industrial Plant



Start up

Shape of particles:

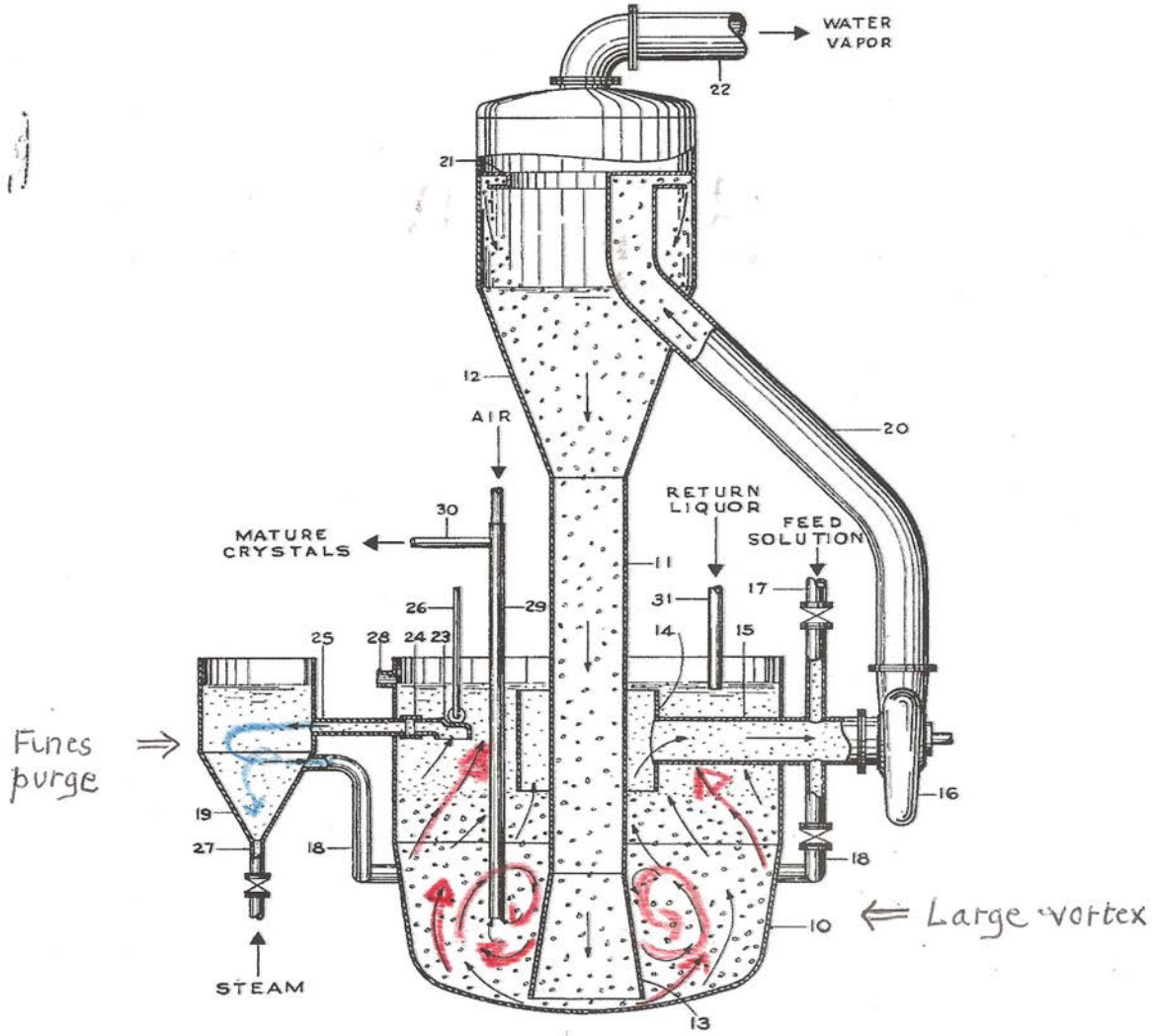
- Particles not spherical
- Particles damaged by large vortex at bottom of crystallizer and strong attrition

Control of shape

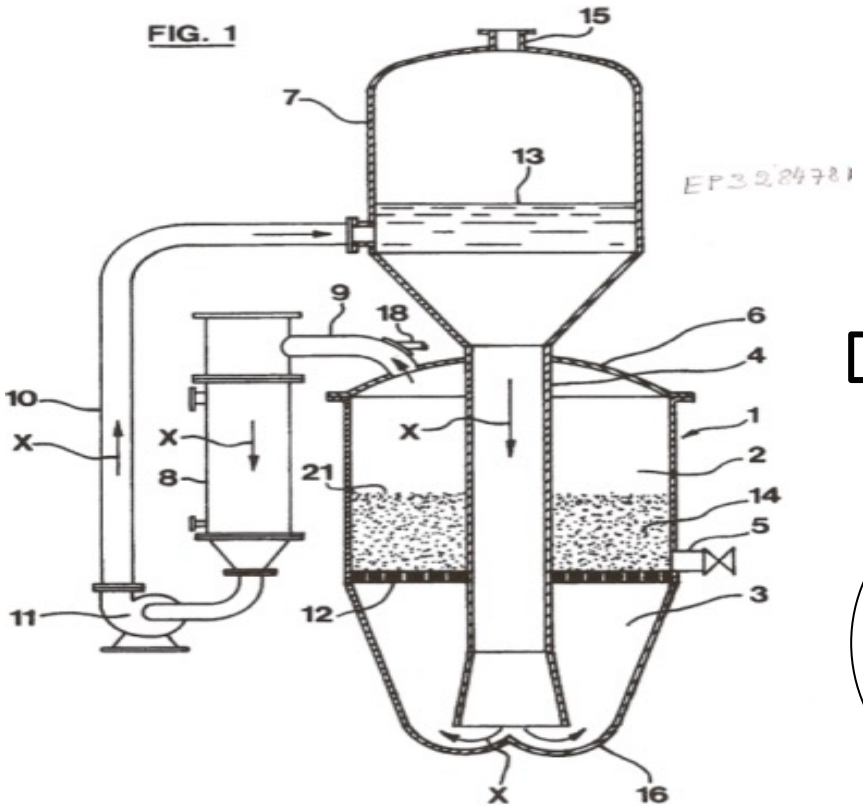
Investigation on cold plastic models

- New design :
- Brine distributor
- Brine evenly distributed
- Scaling avoided
- Jet erosion limited

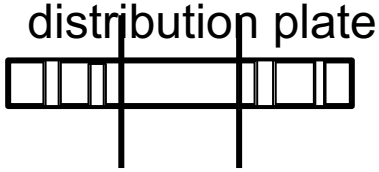
Example :vortex and fines purging

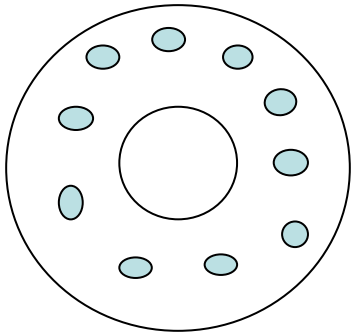


Suppression of vortex



Heated brine distribution plate





Start-up (2)

Control of particle size

- At start-up , size limited to 1.5 mm due to erosion and uncontrolled nucleation
- Self cleaning of interface liquid vapor

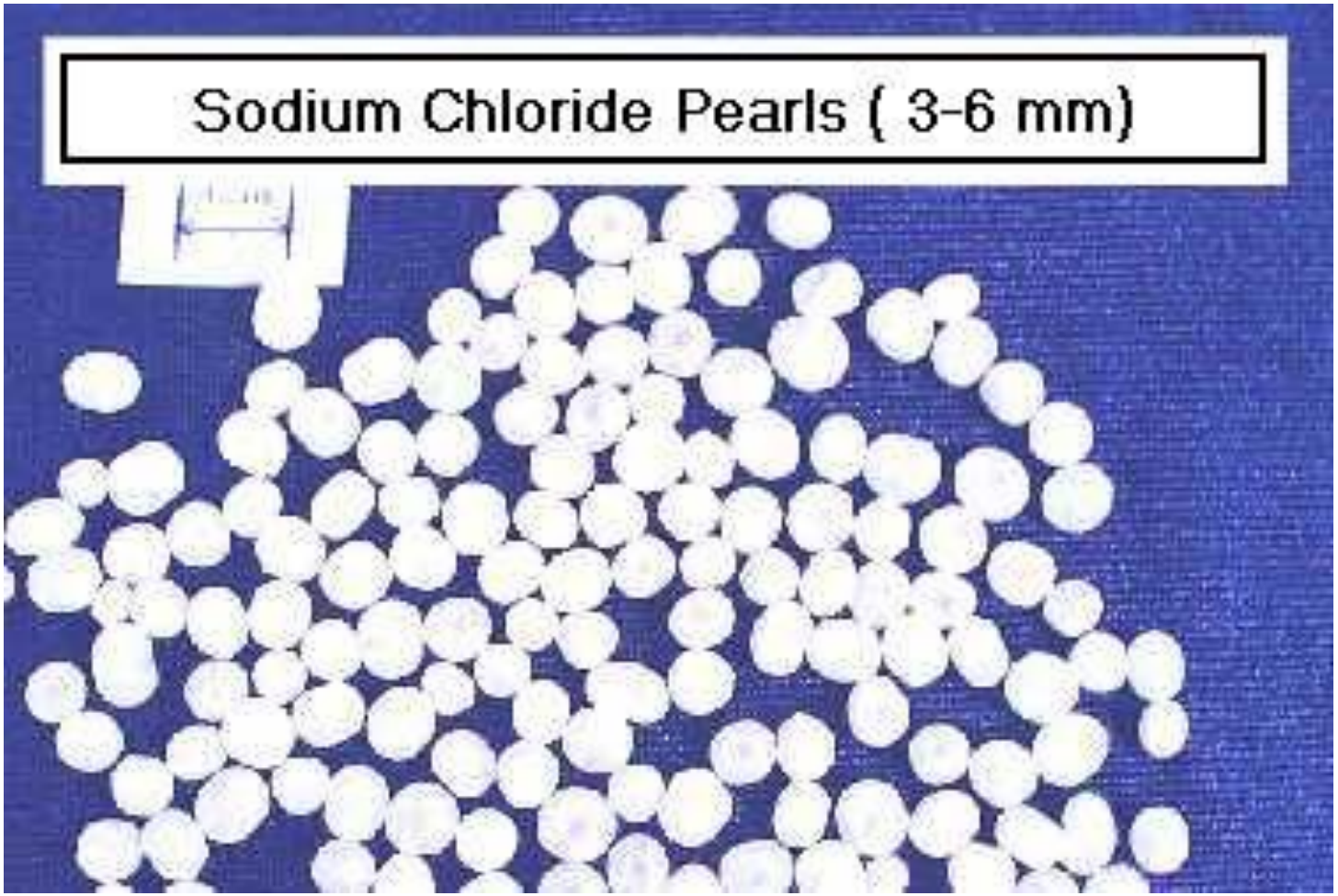
Effect of large vortex suppressed

Fines removal

- Cut-off size removal by decanter = 300 µm
- Fines >300 µm and <700 µm turn in whole equipment

Particles >700 µm are captured by fluid bed

Results



Applications to other salts

- Limitation of existing technology pushed up
- Orientation test have proved application possible to other salts

  Large range of sodium salts

  Potassium salt (K_2SO_4) , ammonium salt $(NH_4)_2SO_4$,..
- Full comparison investment and operating cost can be carried out :

  Crystallizer +separation +drying +Compaction

  OSLO crystallizer + limited dryer

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

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