Instituto de Energías Renovables UNAM

INSTITUTO DE ENERGÍAS RENOVABLES

EXPERIMENTAL ASSESSMENT OF A SOLAR COOLING SYSTEM FOR ICE PRODUCTION

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"Energy, Sustainability and Climate Change"**

ESCC 2017

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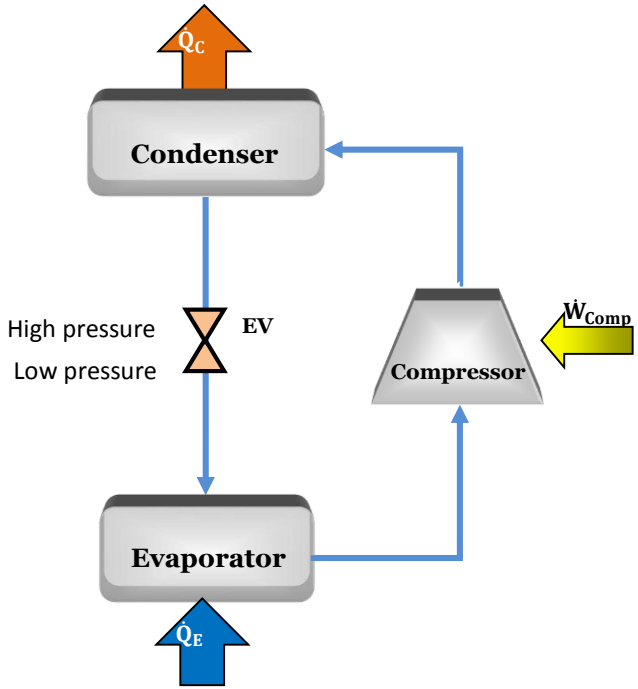
Objetive:

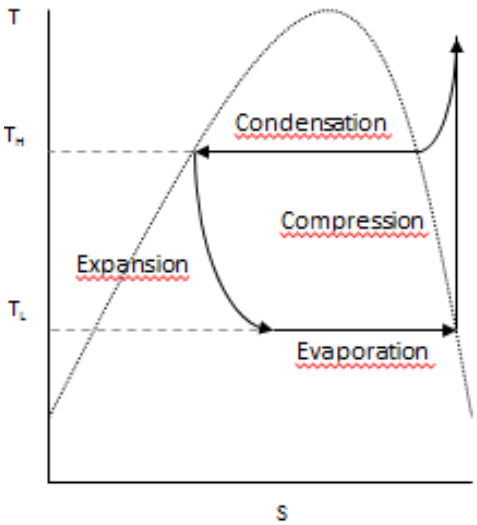
Development of an absorption cooling system with a capacity of 8 kg/day of ice production using exclusively solar energy as the heat sorce.

Secundary objetives:

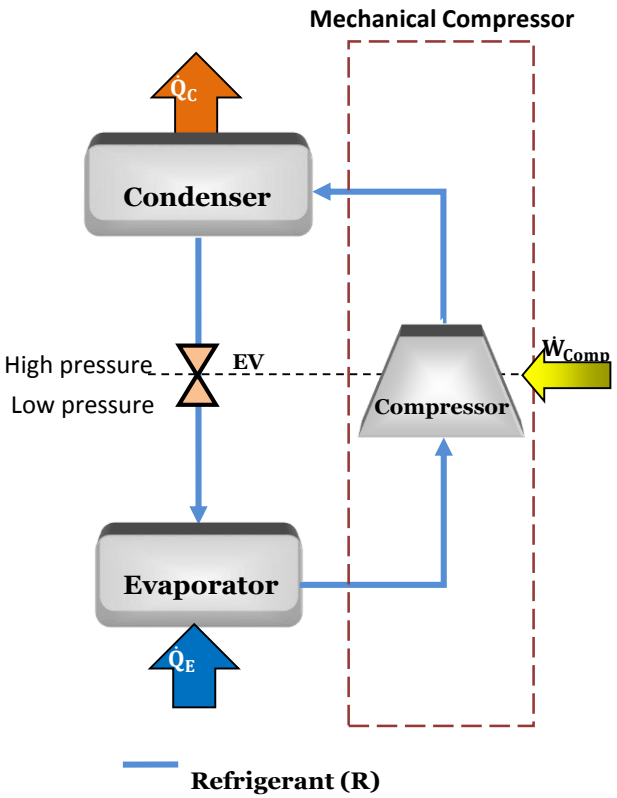
- Development of a CPC to cencentrate the solar radiation to produce the refrigerant.
- Determination of the working mixture to be used in the system.
- Development of the absorption cooling system

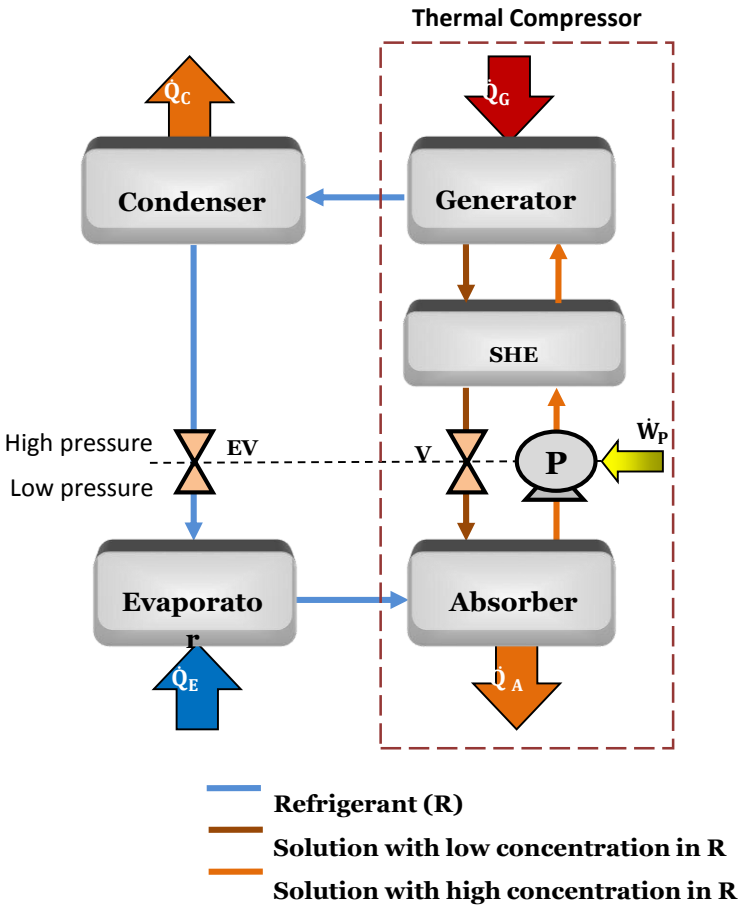
Compression cooling cycle



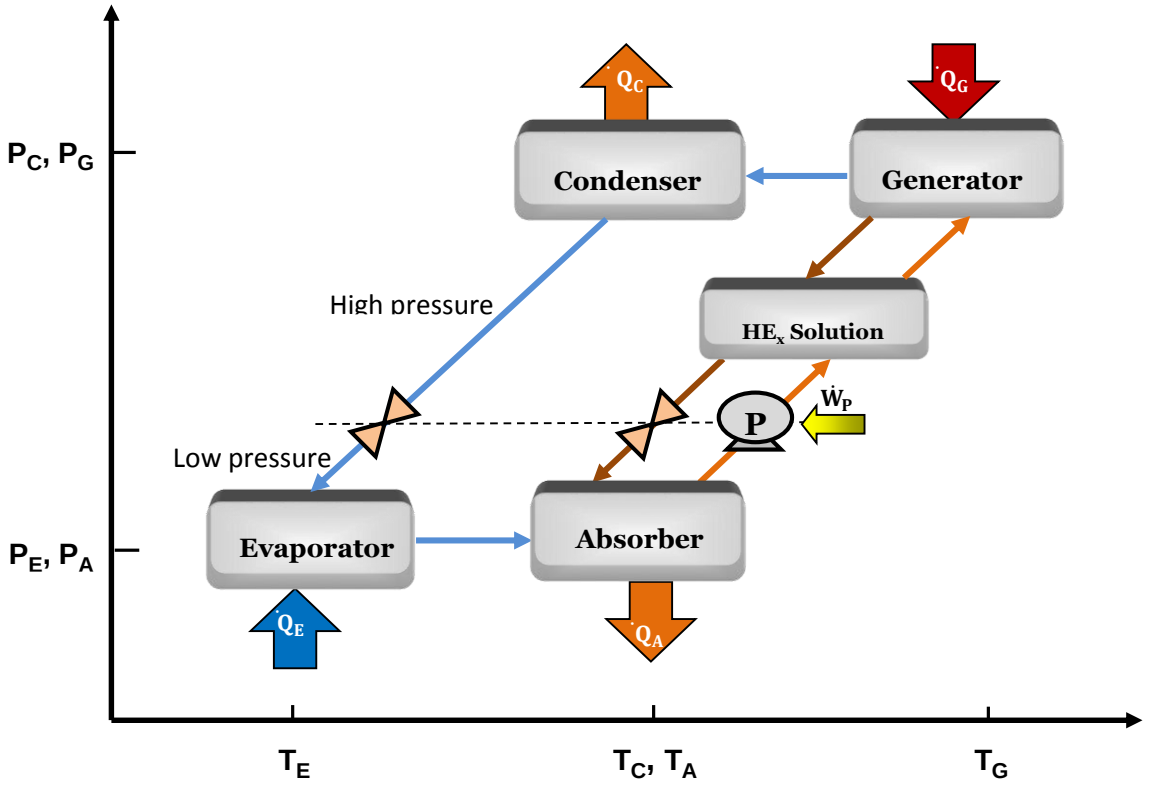


Compression and absorption cooling cycles

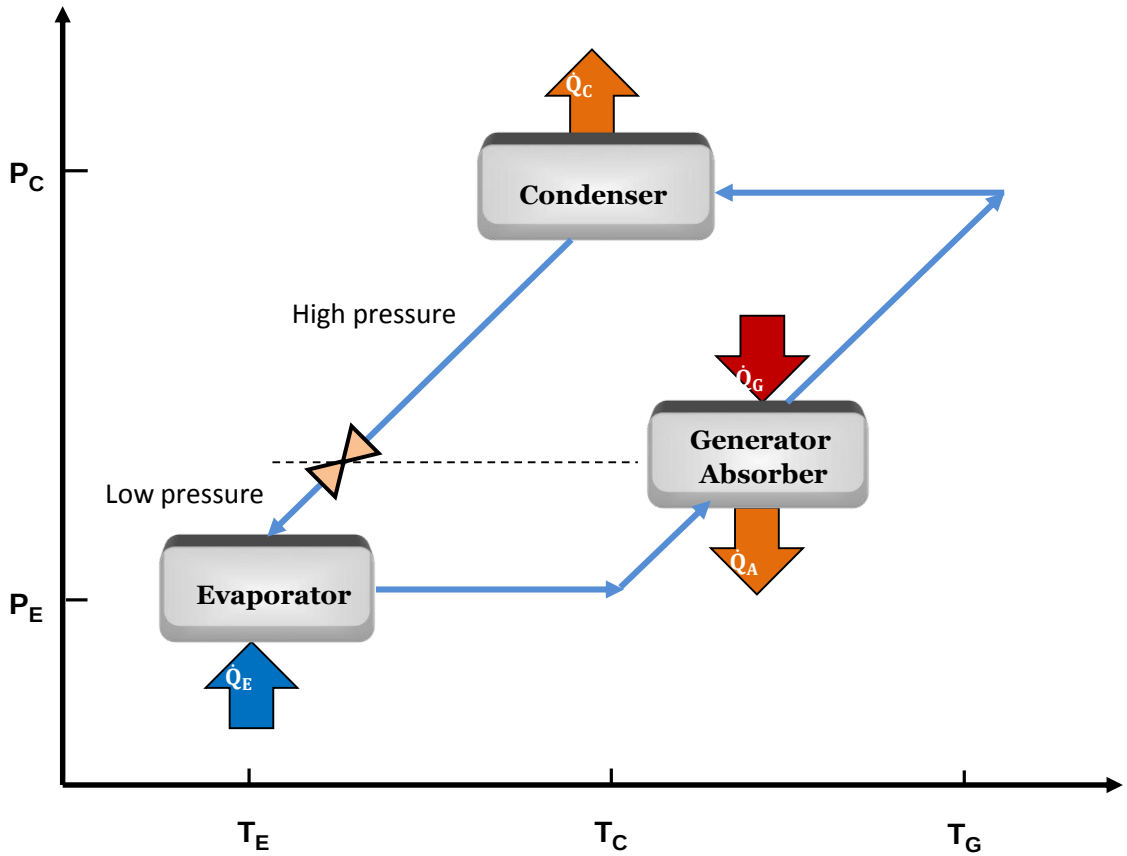




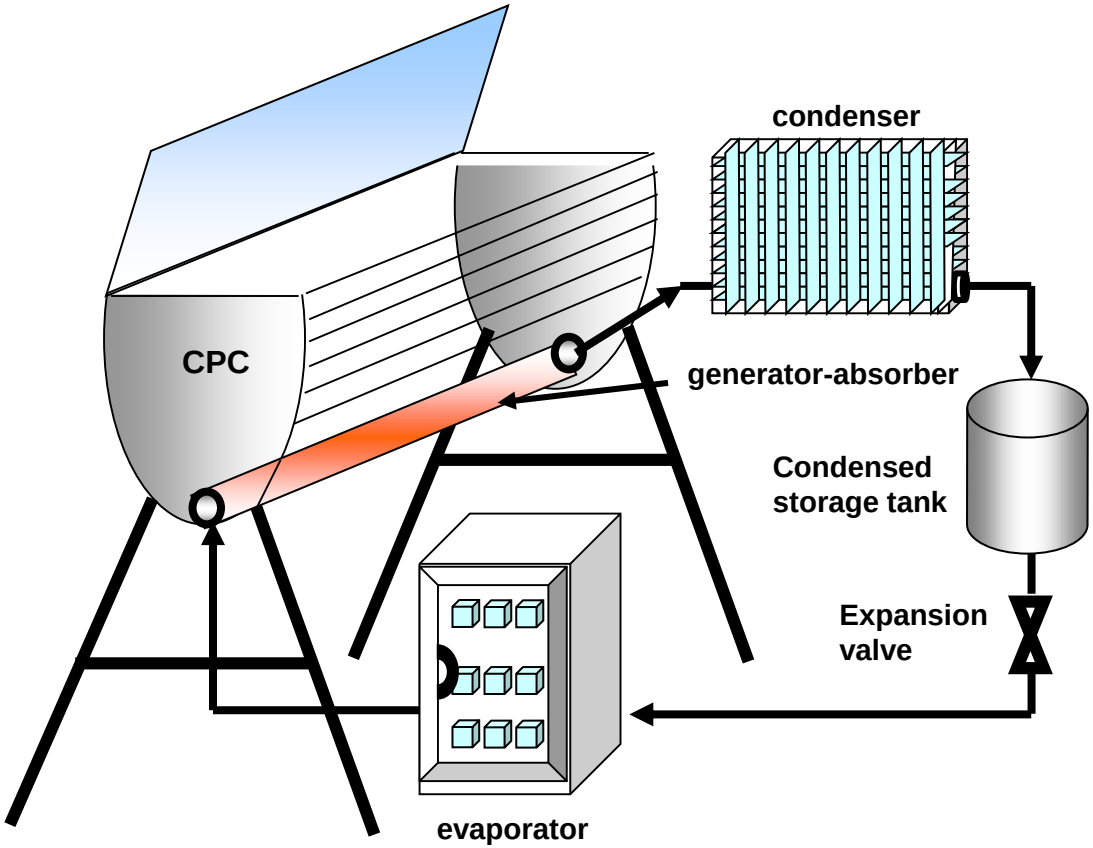
Absorption cooling system



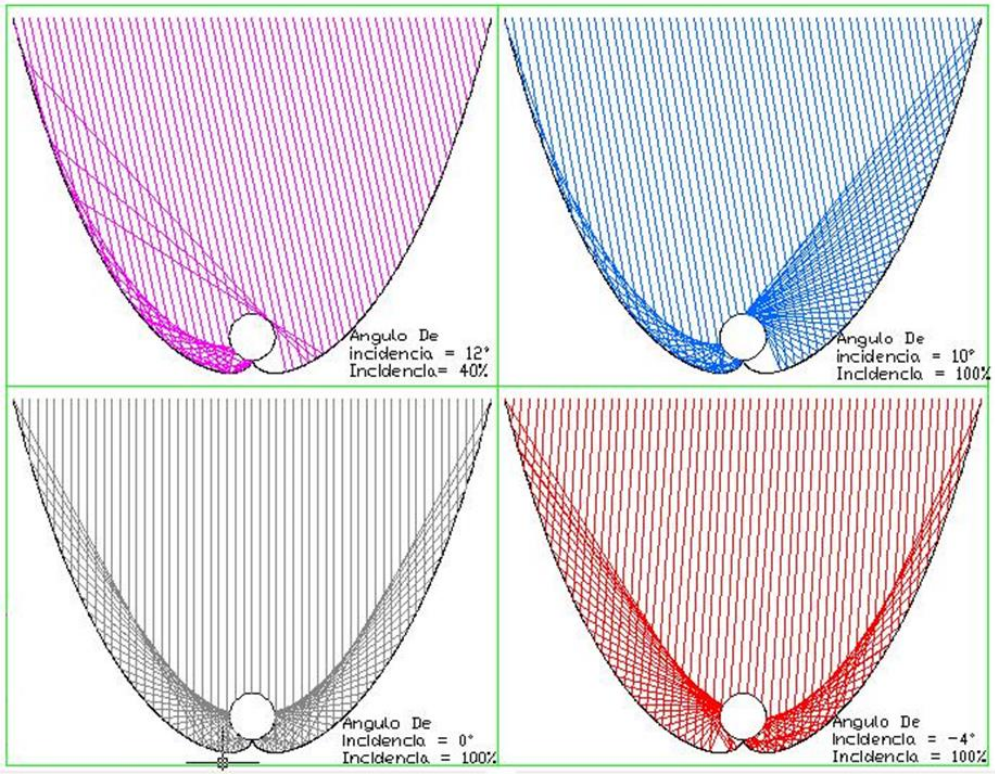
Intermittent absorption cooling system



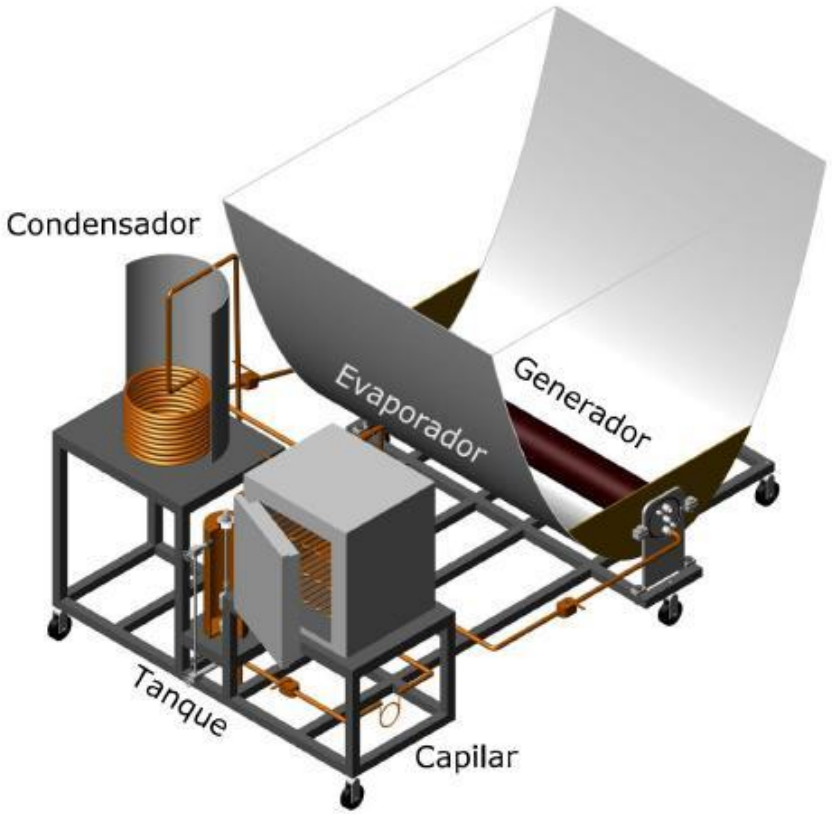
Conceptual system diagram



Ray tracing at different incidence angles on the CPC



Schematic diagram of the system



First ptototype

Final prototype

Main equations

Ammount of ammonia produced:

$$m=\rho v$$

Energy received by the CPC:

$$Q_R=\sum_{i=1}^{n} H_i t A$$

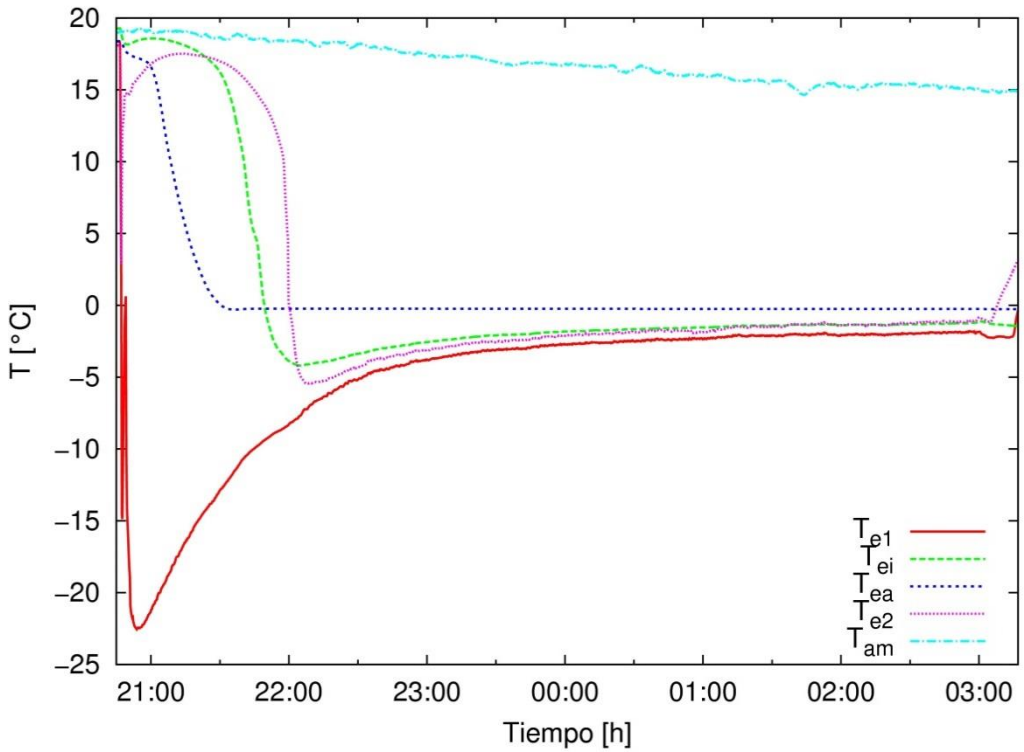
Cooling power:

$$Q_{EV}= m_{H2O}\left(C_p \Delta T + h_f\right)$$

Coefficient of performance:

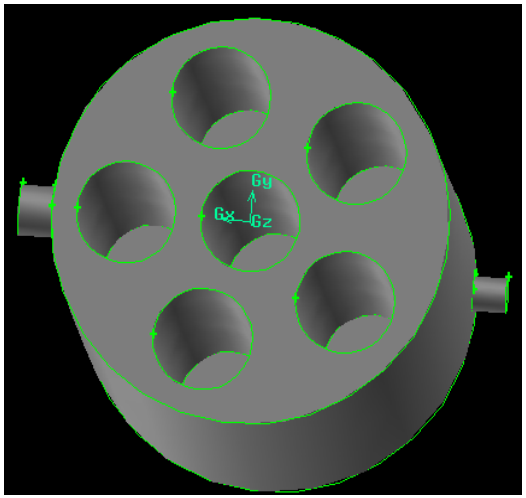
$$COP_S=\frac{Q_{EV}}{Q_R}$$

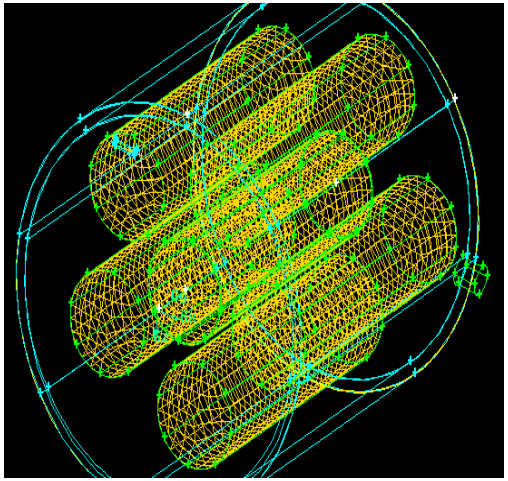
Temperatures profile of the system



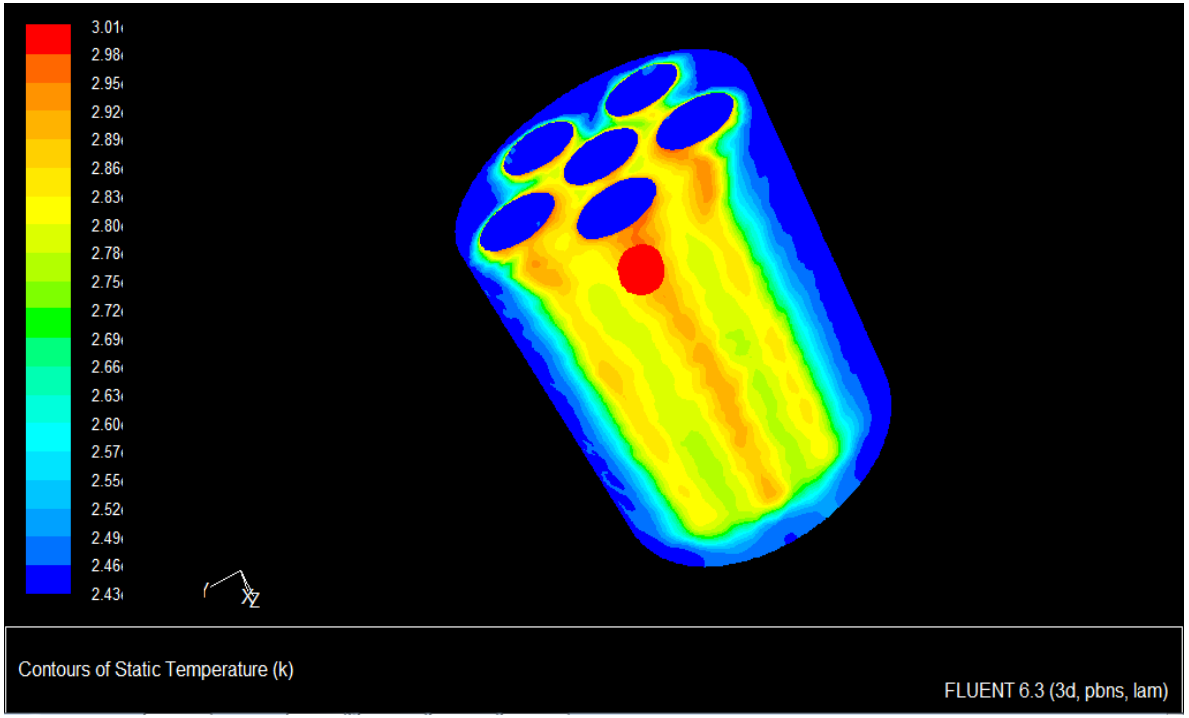
Internal view of the fisrt evaporator and ice produced

Modelling of the cylindrical evaporator on CFD

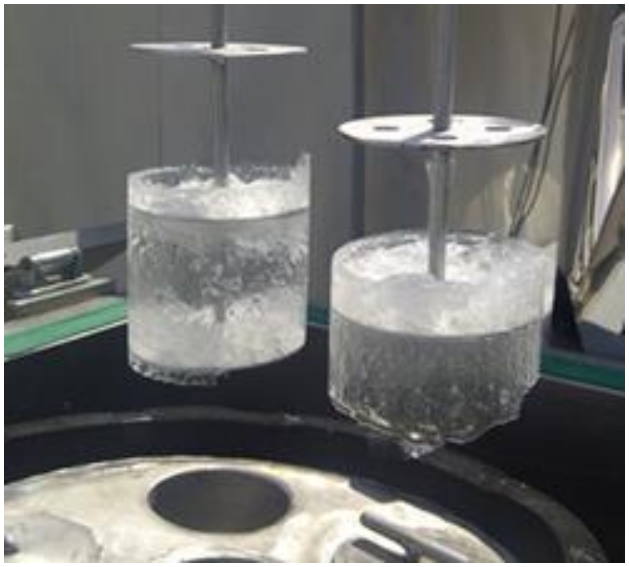




Modelling of the cylindrical evaporator on CFD



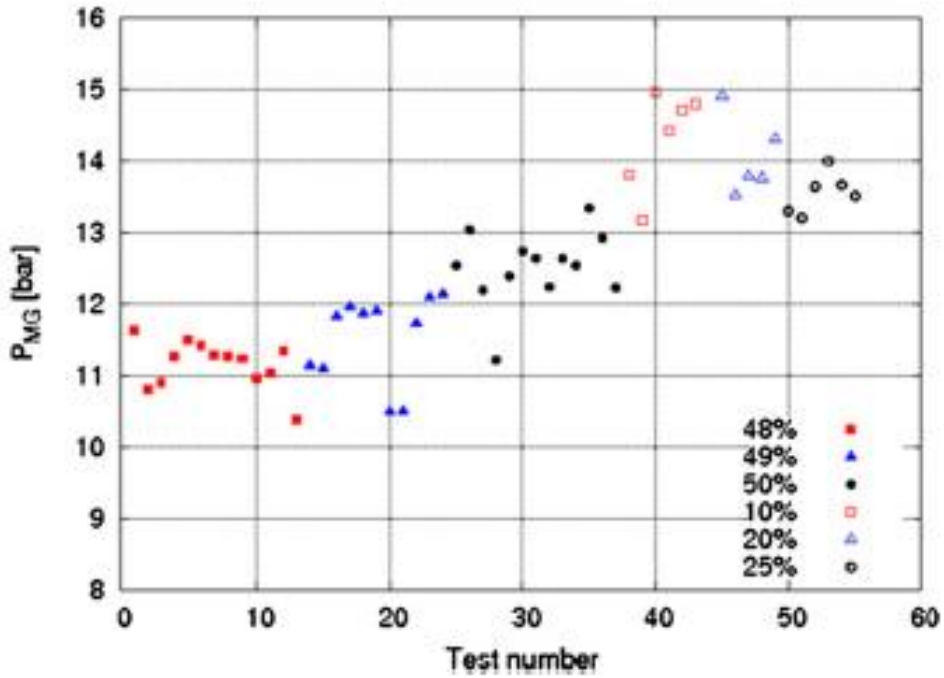
Ice produced in the cylindrical evaporator No. 1



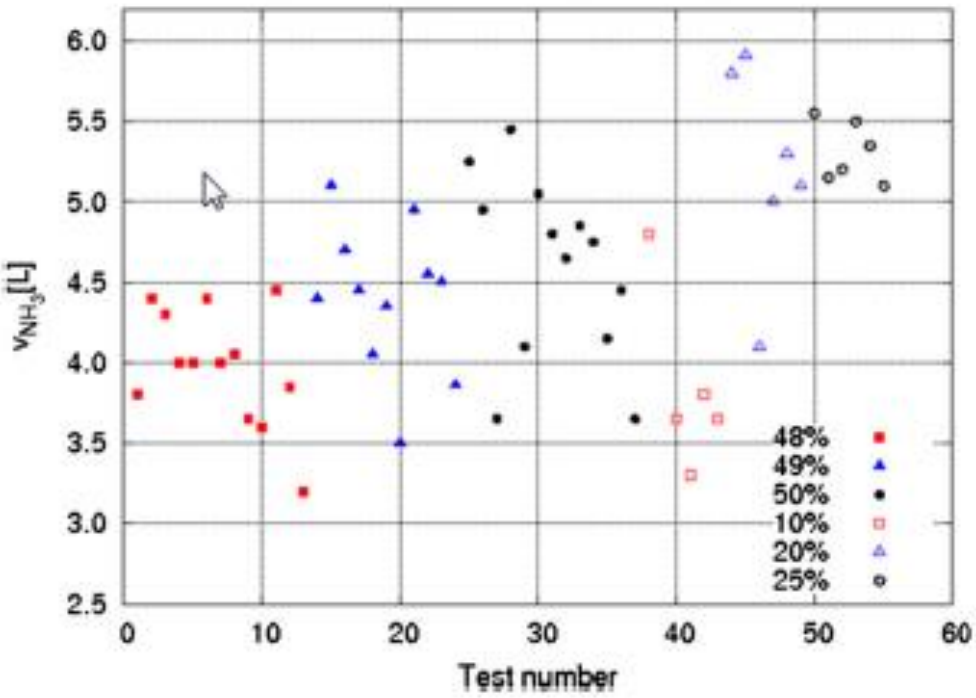
Ice produced in the cylindrical evaporator No. 2

Ice produced in the cylindrical evaporator No. 2

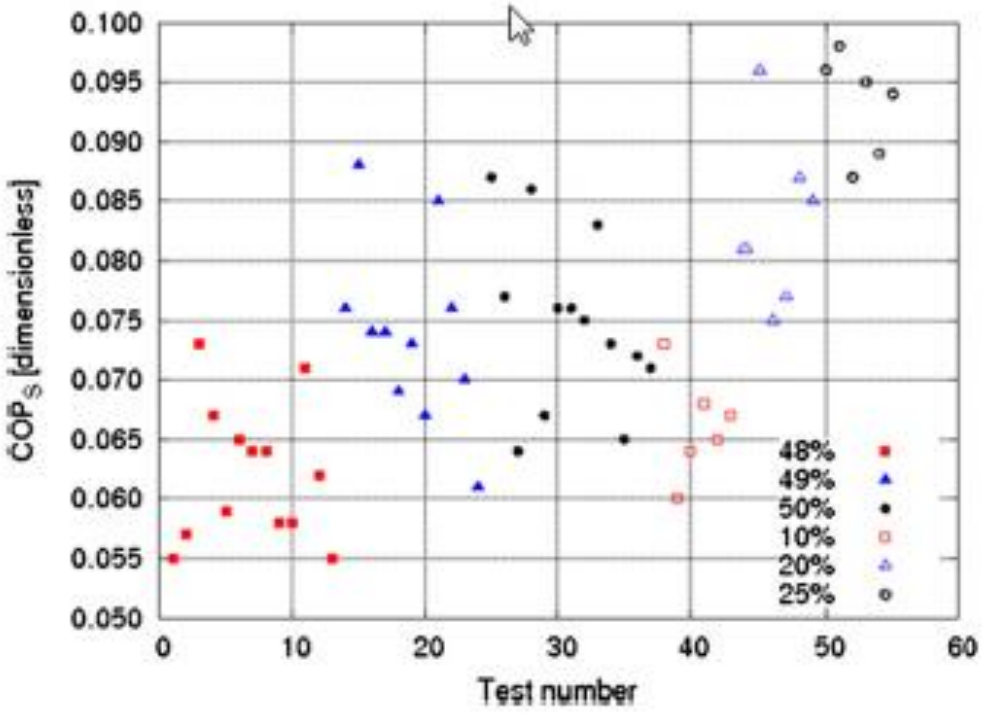
Generator pressures



Ammonia produced by the system



Solar coefficients of performance



! Thanks for your atention !

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