annual distillate provided by the plant. The analysis put in light the flexibility and the efficiency of the innovative scheme. The model also allows the desalted water cost analysis and represents the basis for further techno-economical investigation relative to innovative layouts and other exploitable energy sources.

Keywords: Solar energy, HDH, Aspen plus, Packed towers

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A continuous plug flow reactor for magnesium recovery from concentrated brine

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Magnesium is one of the eight most abundant elements on the world and the third most abundant in the sea, but practically only two countries (Russia and China) control the world market for this compound. Due to this, the European Commission has recently included magnesium and magnesite among the 20 most "critical raw materials" for European economy and supply security. As demonstrated by previous literature works, exhausted brines or bitterns can represent a rich source of magnesium with a Mg^{2+} concentration being between 20 and 30 times more than in typical seawater. Magnesium recovery from bitterns has been already demonstrated to be feasible by reactive crystallization of $Mg(OH)_2$, identifying better process performances (in terms of Mg purity and recovery) in batch reactors rather than CSTR continuous crystallizer. However, in order to move the R&D towards the development of a continuous reactor for Mg recovery, a plug flow reactor (PFR) at laboratory scale has been constructed, to replicate the behaviour of a bath reactor in a continuous production process. The lab-scale PFR was adopted in a wide experimental campaign to investigate the Mg-recovery performance using bitterns (i.e. exhausted brines) from real saltworks (Trapani, Italy), operated through a mixed feed of seawater and desalination brines. Different alkaline solutions were adopted as secondary reactant, in order to analyse the effect of changing the alkaline species and its concentration, namely: sodium hydroxide, calcium hydroxide, sodium carbonate, ammonia. Product purity, Mg recovery, crystal morphology and granulometric distribution of precipitated particles were examined through careful laboratory analysis and results from different tests were compared, in order to identify the effect of alkaline species' nature and concentration on precipitation phenomena.

Keywords: Brine disposal; Magnesium; Mineral recovery; Saltworks; Reactive crystallization