

## Study of the vapour pressure of saturated salt solutions and their influence on evaporation rate at room temperature

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### ABSTRACT

Brine disposal is an important problem in desalination facilities, especially in inland plants. Nowadays, the management alternatives to treat these brines are focused on reducing brine volume to solid state. There are different treatments to reduce brine volume such as evaporation ponds, brine evaporators, evaporation with extended surfaces and zero liquid discharge technologies. With reference to the treatments based on evaporation, vapour pressure of brines is a relevant factor. In this work, vapour pressure of salt solutions containing the major ions present in brines has been studied in order to estimate its influence on the evaporation rate at room temperature. To this aim, vapour pressure has been studied by means of an experimental setup equipped with a hygrometer. Solutions studied included the following ions:  $\text{Na}^+$ ,  $\text{Cl}^-$ ,  $\text{CO}_3^{2-}$ ,  $\text{HCO}_3^-$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  and  $\text{SO}_4^{2-}$ . Experiments were performed in the temperature range of 25–40°C, with saturated, unsaturated solutions and their mixtures. Moreover, additional experiments were performed to relate vapour pressure with natural evaporation of different salts under typical Mediterranean climate conditions. The obtained results are useful for design of evaporation treatments at room temperature.

*Keywords:* Vapour pressure; Evaporation; Salt; Brine

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