

Use of WAIV for concentrating mineral brines

WAIV has been shown to be a useful way to concentrate mineral brines without using fossil fuel energy (and adding to CO₂ levels) and without using extensive land requirements needed in order to build evaporation ponds. The following two examples illustrate this point.

Case Study 1: Evaporation of phosphoric acid

After dissolving the phosphate rock in sulfuric acid the phosphoric acid is progressively concentrated from 28% P₂O₅ up to 41% P₂O₅ using thermal evaporators. These are extremely expensive as they require specially lined evaporators and heat exchangers and the energy requirements are considerable. A preliminary pilot study has shown that a WAIV unit can concentrate 100 metric tons/hour of this acid from 28 – 40 % P₂O₅, with a unit that occupies 1.9 hectares of footprint. An evaporation pond would have required 30 times the same area footprint.

In the preliminary study, 25 m² of wetted vertical WAIV surface concentrated 0.75 m³ of acid from 32% - 41.7% P₂O₅ in less than 9 days.

Case Study 2: Evaporation of hypersaline brine for carnallite recovery

Preliminary studies run for over 6 months showed that a WAIV unit with 500 m² of wetted surface could evaporate hypersaline brines at a rate of 1-3 mt H₂O/d per 1000 m² of wetted WAIV surface (See figure below). This worked out to 300-1000 m³/d/hectare WAIV footprint. The brines were concentrated to the point where sodium chloride precipitated but potassium chloride did not. It was found that passing 3.5 mt/h once-through the WAIV unit allowed concentration of potassium relative to sodium of 9.5%.



WAIV Pilot unit in Dead Sea Works - Israel