

## Indirect calculation of Langelier saturation index and sodium adsorption ratio for remineralised waters from data on electrical conductivity and pH prior to and following remineralisation

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### ABSTRACT

This article shows the results obtained about the possibility of the indirect calculation of SDI and sodium adsorption ratio (SAR) based on electrical conductivity at 25°C ( $EC_{25}$ ) and pH data prior to and following remineralisation, using the quotient between  $EC_{25}$  and alkalinity (Alk). The importance of this work is to propose a new calculation method which is required to estimate with certain precision the increase in alkalinity and hardness that has been achieved with remineralisation. It is justified to investigate the relationship between the alkalinity values and the remineralised water. The novelty of this work is to have been done based on real data taken from different desalination plants as well as theoretical calculations based on the contribution of each ion to the conductivity of the water. For instance, Alk(0) ranges are from 0.5 to 2.8 mg  $CaCO_3/L$  for values of  $EC_{25}(0)$  of between 250  $\mu S/cm$  and 700  $\mu S/cm$  respectively. The values of pH(r) and T(r) will be those acquired “*in situ*” with the measuring equipment placed in line. Once all the parameters have been obtained, the Langelier saturation index LSI(r) calculation method should be SM-2330. This procedure allows LSI(r) to be estimated with an accuracy in between of +0.05 and -0.05. According to the study performed and to achieve the optimum levels indicated in Table 1, the increase in alkalinity should be at least 55 mg  $CaCO_3/L$ . This implies that the increase in electrical conductivity should be within the range 85–97. The mean value of SAR or sodium absorption rate of desalinated water is around 9. This point to water that can cause damage not only to the soil but also to some crops due to an excess of sodium over calcium and magnesium. This aspect should therefore be corrected. Either with a remineralization or by adding calcium and magnesium directly with fertilizers. The sampling conditions should be optimized to prevent loss of  $CO_2$  and obtain values of pH and temperature as close to operating conditions before and after remineralization system.

**Keywords:** Remineralisation; Reverse osmosis; Desalination; Langelier saturation index; Sodium adsorption ratio; Electrical conductivity

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