

Air purging as a method to remove trace elements from alkaline waters

LINNEA FAHLQVIST¹ AND MATTIAS BÄCKSTRÖM^{2*}

^{1,2}Man-Technology Environment Research Centre, Örebro University, SE-701 82, Örebro, Sweden, (mattias.backstrom@oru.se)

Alkaline waters containing oxyanions (e.g. vanadate and molybdate) are an increasing problem with increased utilization of alkaline waste materials (slags and ashes). By lowering pH sorption of negative ions should increase, thus lowering the concentrations. Carbonic acid can be created by purging the alkaline waters with air lowering the pH through formation of calcite [1]. In this study two synthetic alkaline waters (A-LD and FS) were treated by purging air through the solutions for several hours. Original pH in the two waters were 12.4 (A-LD) and 7.92 (FS), respectively. These pH corresponds to equilibrium with portlandite ($\text{Ca}(\text{OH})_2$) and calcite (CaCO_3), respectively.

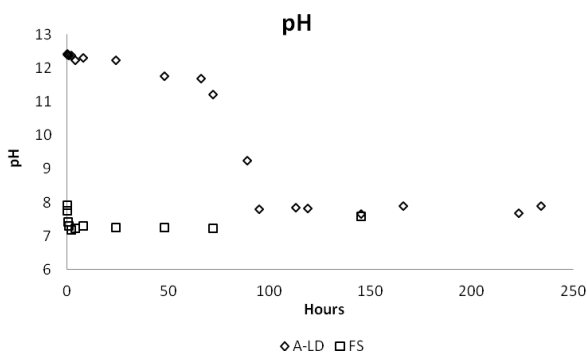


Figure 1: pH as a function of time during purging.

pH decreases sharply from around 11.5 to below 8 after 90 hours of bubbling in the highly alkaline water (A-LD) while the pH is more or less unaffected in the near neutral sample (FS). Drop in pH coincides with a sharp drop in alkalinity as well (from originally 55 meq/L to around 1 meq/L).

In the highly alkaline water vanadium (89 to 3.7 $\mu\text{g/L}$), zinc (3 410 to 1.1 $\mu\text{g/L}$) and lead (6 240 to 526 $\mu\text{g/L}$) decrease significantly while chromium (311 to 303 $\mu\text{g/L}$) and molybdenum (316 to 323 $\mu\text{g/L}$) are mostly unaffected. In the lower pH sample (FS) the affects are negligible. Probable removal mechanisms are sorption and/or coprecipitation to the formed carbonate minerals.

[1] Van Zomeren A. *et al.* (2011) *Waste Manag.* **31**, 2236–2244