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Use of Chemical Extractions to Estimate the Metals Availability in Bricks Made of Dredged Sediments

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Abstract : SEDIBRIC (valorization de SEDIments en BRIQues et tuiles) is a French project that aims to replace a part of natural clays with dredged sediments in the preparation of fired bricks in order to propose an alternative solution for the management of harbor dredged sediments. The feasibility of such re-use is explored from a technical, economic, and environmental point of view. The present study focuses on the potential environmental impact of various chemical elements (Al, Ca, Cd, Co, Cr, Cu, Fe, Ni, Mg, Mn, Pb, Ti, and Zn) that are initially present in the dredged sediments. The total content (after acid digestion) and the environmental availability (estimated by single extractions with various extractants) of these elements are determined in the raw sediments and in the obtained fired bricks. The possible influence of some steps of the manufacturing process (sediment pre-treatment, firing) is also explored. The first results show that the pre-treatment step, which uses tap water to desalinate the raw sediment, does not influence the environmental availability of the studied elements. However, the firing process, performed at 900°C, can affect the amount of some elements detected in the bricks, as well as their environmental availability. We note that for Cr, or Ni, the HCl or EDTA availability was increased in the brick (compared to the availability in the raw sediment). For Cd, Cu, Pb, and Zn, the HCl and EDTA availability was reduced in the bricks, meaning that these elements were stabilized within the bricks.

Keywords : bricks, chemical extraction, metals, sediment
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