

## FROM BAUXITE RESIDUE TO CALCIUM SULFO-FERROALUMINATE CEMENT: STUDY OF THE CLINKERIZATION AND HYDRATION KINETICS

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### ABSTRACT

Every year the extraction of alumina by Bayer process means from the bauxite ores produces more than 150 MT of bauxite residue (BR)<sup>[1]</sup>. Only a small percentage of this amount is used productively by other industries (2 – 3 wt%) while most of it is stored in legacy sites. Due to the fact that alumina industry needs to consume large amounts of BR, construction materials have been proved in the past as an interesting way to allocate large amounts of this waste to obtain profitable products<sup>[2]</sup>. Amongst the different building materials available<sup>[3-4]</sup>, calcium sulfo-ferroaluminate (CSFA) cement seems a promising path. This is due to the fact that CSFA chemistry is favorable to the BR chemical composition<sup>[5]</sup>.

The present study aims to offer a better understanding of the clinkerization process when introducing high amounts of BR (55 – 65 wt%) and the hydration kinetics of the produced cements. In order to achieve that, 4 CSFA clinkers were prepared by firing at 1250 °C. The phase composition of the produced clinkers was studied by X-ray diffraction and quantified by Rietveld analysis. The resulting clinker was ground as-is to produce cement. The hydration kinetics of the resulting cement was studied by a combination of setting time, calorimetry and in-situ XRD technique. The experimental results suggest that CSFA cement with BR as a main component is feasible to produce a fast-setting material with moderate mechanical properties.

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