




## Article

# Potential use of Kebilian clay reserves (southern Tunisia) for the production of geopolymer materials

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### Abstract

The aim of this study was to help drive the Tunisian construction industry towards a more sustainable approach given the existence of abundant local raw material deposits that could be exploited for the production of low-CO<sub>2</sub> binders. Various clay sediments from the Kebili region (southern Tunisia) were characterized by chemical analysis, X-ray diffraction, thermal analysis and geotechnical tests to determine their suitability for the preparation of geopolymer binders. The clays consist of illite and kaolinite with other accessory minerals. To test the possibility of using these materials as precursors for the production of low-CO<sub>2</sub> and low-cost geopolymers, the raw samples were calcined and activated by addition of solid sodium silicate. Compressive strength tests performed on four alkali-activated clays show that promising mechanical performance may be achieved, with mechanical strength values as high as 25 MPa after 7 days, depending on the clay composition. The mechanical strength is related to the SiO<sub>2</sub>:Al<sub>2</sub>O<sub>3</sub> and Al<sub>2</sub>O<sub>3</sub>:(NaO<sub>2</sub> + K<sub>2</sub>O) ratios. Careful selection of the raw materials is, therefore, an essential step in the exploitation of clay deposits to be used for the production of ecological materials such as geopolymers.

**Keywords:** alkali activation, clay characterization, geopolymer, Kebili, Tunisia

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