




# A preliminary mineralogical and physicochemical characterization of the Neogene clays from the Timgad Basin (Massif of Aurès, NE Algeria): potential use in the manufacturing of bricks and ceramic industry

Bachir Lamouri<sup>1,2</sup>  · Sedik Abdallah Labadi<sup>2</sup> · Mechat Boukoffa<sup>1</sup> · Ibtissem Chouaf<sup>1</sup> · Hocine Djouder<sup>3</sup> · Fouad Djaiz<sup>4</sup> · Lakhdar Bouabsa<sup>1</sup>

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## Abstract

**Abstract** This study aims at the mineralogical and physicochemical characterization of the clay formations of the Miocene age from the Timgad Basin (Massif of Aurès, NE Algeria), in order to evaluate their possible valorization, notably for their potential use in the manufacturing of bricks and ceramic industry. For this purpose, four samples were taken from a clay-dominated formation that outcrops 5 km east of the Timgad city. Each sample was collected, prepared, and analyzed by the appropriate analytical methods of characterization such as X-ray diffraction, X-ray fluorescence, and scanning electron microscopy. Moreover, other complementary analyses are performed in this study such as laser granulometry and geotechnical tests. The results of the different tests revealed that the clay formations of the Timgad Basin are non-refractory clays and characterized by medium plasticity. These clays are constituted of more than 50% of fine fraction, mainly represented by kaolinite in association with non-negligible proportions of illite, chlorite, mixed-layer clay minerals, and traces of smectite. Besides, this clayey assemblage is accompanied by some proportion of quartz and calcite, as well as traces of hematite, feldspar, and gypsum. In the light of these results and in combination with the particle size distribution, as well as the results of geotechnical tests, it is concluded that the Neogene clays of the Timgad Basin present high limits of Atterberg. Consequently, their use in the field of manufacturing of bricks and terra cotta 'Terre Cuite' products is subordinated to a preliminary treatment with addition of a degreasing agent, in the form of coarse sand, in order to improve their plasticity.

## Article Highlights

- Mineralogical and physicochemical properties of the Neogene clays from the Timgad Basin have been investigated.
- The studied clays have ideal mineralogical composition and physicochemical properties thus making them applicable in the manufacturing of bricks and ceramic industry.
- Addition of coarse sand to the Neogene clays will greatly improve the plasticity of these raw materials.

✉ Bachir Lamouri, bachir.lamouri@univ-biskra.dz | <sup>1</sup>Laboratory of Geodynamics and Natural Resources (LGRN), University of Badji Mokhtar Annaba, BP 12, Sidi Ammar, Annaba, Algeria. <sup>2</sup>Laboratory of Hydraulic Developments and Environment (LAHE), University of Mohamed Kheider Biskra, BP 145 RP, Biskra, Algeria. <sup>3</sup>Sedimentary Petrology, University of Liège, B20, Quartier Agora, Allée du Six Août, 12, 4000 Liège, Belgium. <sup>4</sup>Laboratory of Mobilization and Water Resources Management (LMGRE), University of Mustapha, Ben Boulaid Batna 2, Route de Constantine 53, Fésdis, Batna, Algeria.

