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Abstract

Thermal-Modified Polymer as a Sustainable Solution for the Enhancement of Clay Material Properties †

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This research assesses the effect of a thermal-modified polymer (TMP) on the properties and durability of unfired clay materials. The study describes the technology involved in the TMP (retrograded starch hydrogel) preparation and investigates the influence of various TMP concentrations (2.5%; 5%; 7.5%; 10%) on the properties, structure and durability of the clay materials. An assessment of the obtained clay materials showed dense structures, with increasing densities of up to 2.5% (from 1990 to 2040 kg/m^3), as well as increasing ultrasonic pulse velocity (from 1265 to 1460 m/s). The mechanical strength results increased up to 62% (6.8 to 11 MPa) with increases in the concentration of retrograded starch hydrogel. The adsorption rate increased up to 29% (from 140 to 180 g/m^2) in the control clay sample without the TMP. Moreover, the durability (water erosion test) of the TMP-modified clay samples also increased. In general, the TMP had a positive effect on the properties, structure and durability of the clay and can be used to replace water in the production of clay materials.

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