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Valorisation of Sewage Sludge in Geopolymer Binder

Authors : A. Fernandez-Jimenez, O. Maltseva, A. Palomo, M. P. Riccardi, M. Zema, S. C. Tarantino

Abstract : Hydrothermal depolymerization or liquefaction (HTL) technology is an innovative and promising solution to greatly reduce the volume of sewage sludge and recover raw materials from these wastes. In this work, the possibility of using the inorganic residue obtained after such treatment in a geopolymer binder is evaluated. Initially, the waste was characterized, and a thermal treatment at 800ºC was carried out to eliminate organic matter and improve its reactivity. Calcined clay (2h at 800ºC) was used to manufacture the geopolymer. Calcined clay/residue mixtures 100/0, 90/10, and 80/20 were prepared and activated with a solution of NaOH 6M. The pastes were cured for 20h at 85ºC. Paste compressive strengths were evaluated, and reaction products were characterized by XRD, FTIR, and microscopy. The results show a low degree of reaction of the residue. However, it is observed that part of the phosphorus present in the residue can react and be incorporated into the reaction products formed during alkaline activation.

Keywords : geopolymer, sewage sludge, characterization, waste valorisation
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