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Elaboration and characterization of new ceramics materials made from clay and washing phosphate sludge

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Moroccan phosphate industry produces a wide range of by-products (waste rock, sludge, and tailings) which are usually stored in dikes or thrown into the sea lead to cause an adverse effect on the environment (REF). In this study, the valorization of phosphate sludge from phosphate mines as ceramics was made at low temperature is discussed which is interesting to understand the effect of the presence of phosphorus oxide (P_2O_5) on the development and evolution of mineral phases during sintering. As a result, it seems possible to improve sintering process of phosphate sludge by doping a material contain melting elements.

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Effect of natural phosphate on the microstructure and mechanical properties of porous ceramic from raw clay

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This study aims to develop and characterize a low cost porous ceramic membrane from Moroccan natural resources by following a different approach. It consist in producing macro-porous ceramics through the dry compaction process by blending different proportions of raw clay with Moroccan natural phosphate which is highly rich with organic matter as a natural pore-forming agent. Thereafter, the compacted granulate produced as a result of the preceding technique is sintered at a high temperature of 1100 °C. All samples undergo the characterization technique of TG-DTA, SEM, XRD, dilatometry and mechanical strength test. It was found that the microstructure and mechanical properties are strongly influenced by the amount of natural phosphate added (10-40 wt.%). Therefore increasing the amount of phosphate lead to increase of the open porosity and pore size while the flexural / tensile strength decreased accordingly to a diminution of raw clay amount. The largest average size of 5 micron pores with a porosity of 28.11%, tensile and bending strength of 11 MPa and 17.5 MPa respectively was determined based on a sample prepared of 60 wt.% clay and 40 wt.% of natural phosphate sintered at 1100°C.

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