

Olive Stone Valorization to Its Application on the Ceramic Industry

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Abstract : Olive oil is a product of particular importance within the Mediterranean and Spanish agricultural food system, and more specifically in Andalusia, owing to be the world's main production area. Olive oil processing generates olive stones which are dried and cleaned to remove pulp and olive stones fines to produce biofuel characterized to have high energy efficiency in combustion processes. Olive stones fine fraction is not too much appreciated as biofuel, so it is important the study of alternative solutions to be valorized. Some researchers have studied recycling different waste to produce ceramic bricks. The main objective of this study is to investigate the effects of olive stones addition on the properties of fired clay bricks for building construction. Olive stones were substituted by volume (7.5%, 15%, and 25%) to brick raw material in three different sizes (lower than 1 mm, lower than 2 mm and between 1 and 2 mm). In order to obtain comparable results, a series without olive stones was also prepared. The prepared mixtures were compacted in laboratory type extrusion under a pressure of 2.5MPa for rectangular shaped (30 mm x 60 mm x 10 mm). Dried and fired industrial conditions were applied to obtain laboratory brick samples. Mass loss after sintering, bulk density, porosity, water absorption and compressive strength of fired samples were investigated and compared with a sample manufactured without biomass. Results obtained have shown that olive stone addition decreased mechanical properties due to the increase in water absorption, although values tested satisfied the requirements in EN 772-1 about methods of test for masonry units (Part 1: Determination of compressive strength). Finally, important advantages related to the properties of bricks as well as their environmental effects could be obtained with the use of biomass studied to produce ceramic bricks. The increasing of the percentage of olive stones incorporated decreased bulk density and then increased the porosity of bricks. On the one hand, this lower density supposes a weight reduction of bricks to be transported, handled as well as the lightening of building; on the other hand, biomass in clay contributes to auto thermal combustion which involves lower fuel consumption during firing step. Consequently, the production of porous clay bricks using olive stones could reduce atmospheric emissions and improve their life cycle assessment, producing eco-friendly clay bricks.

Keywords : clay bricks, olive stones, sustainability, valorization

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