

Ceramic bricks from mixtures of clay and peanut shells

Nancy Quaranta¹, Marta Caligaris¹, Gisela Pelozo, Adrián Cristóbal², Rocío Schefer¹ and Leonardo Torrico¹

¹*National Technological University, San Nicolás, Argentina*

²*Mar del Plata National University, Argentina*

Abstract

In this work, a biomass waste, peanut shells, were characterized in order to analyze the possibility of its use as a potential raw material for the manufacturing of ceramic materials for the civil construction industry. The residue was characterized using various techniques such as optical and electronic microscopy, X-ray electron dispersive analysis, analysis of particle size distribution, among others. The ceramic pieces were obtained from green bodies manufactured with mixtures of commercial clay and 5%, 10% and 15% in volume of ground and dry residue, formed by uniaxial pressure of 25 MPa, with addition of 8% in weight of water, into moulds of 70 mm x 40 mm x 15 mm. After a drying period, the samples were heat treated at 950°C following curves similar to those used in the ceramic industry. The DTA-TGA analysis showed a slight loss of water adsorption, and then from 300°C to 550°C, some exothermic peaks that have been assigned to decomposition reactions and combustion of the biopolymers that compose this organic waste material. The weight loss recorded in these tests is greater than 97%. This indicates that when the waste is incorporated in the clay mixture for the manufacturing of ceramic bricks, the residual material finally included after the sintering process is less than 3%. The obtained products have good physical and mechanical properties, with acceptable values of porosity, modulus of rupture, permanent volumetric variation and weight loss on ignition. The sample with 15% of added waste presents a low sinterization grade at this treatment temperature.

Biography

Nancy Quaranta obtained her PhD in Chemistry at the Universidad Nacional del Sur, Argentina. She is a Researcher of the Scientific Research Commission of Buenos Aires Province. She is the Head of Environmental Studies Group and Materials Program Coordinator at the National Technological University. Her current research fields are materials and environmental sciences.

nquaranta@frsn.utn.edu.ar