

14th World Bioenergy Congress and Expo

June 06-07, 2019 | London, UK

Manufacture of light concrete (BCCE) using rolled stone waste residues and inertization of hazardous waste using coconut fatty acid foam

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The state of Rio Grande do Sul is the third largest producer of gemstones in Brazil, only losing to the states of Minas Gerais and Bahia, and agate production stands out in the region of Salto do Jacuí. Great amounts of waste, which are waiting for environmentally correct destination and use, are produced in mining and processing. Particularly, this study assessed the potential use of rolling waste of agates in civil construction, and the manufacturing of foam concrete blocks as a full substitute for sand. Additionally, a mixture was made of two foaming agents derived from coconut fatty acids as air-developer agent, and as hydraulic binder the Portland CP V ARI-RS cement. The production methodology was based on the production model of the blocks in a small industry, which produces and sells foam concrete blocks in the region of Passo Fundo, RS, Brazil. In a previous bench study, the parameters foam composition, residue granulometry, water content, and mix time were adequate and later replicated industrially. The materials composing foam concrete blocks are rolled agate stones silica (SiO₂ – 92.5%), foam from coconut fatty acids, fresh water, and cement as binder. In bench tests, 36 cylindrical specimens were produced, with 50 mm of diameter and 100 mm of height, with different volumes of incorporated air, divided into three groups. The samples were kept at room temperature for 28 days with healing process, and after that, the resistance to compression, density, and air bubbles distribution were analyzed. Results were assessed by analysis of variance and showed that group II presented density of 430 Kg/m³ and resistance of 0.92 MPa. This result is close to meeting the requirements of the norm for resistance class of < 400 Kg/cm³ (NBR 13438, 2013). Also casting residue inertization tests were performed using coconut fatty acid foam for further use in BCCE fabrication.

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