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The Discoid Economizing Model Claims that Red Terracotta is made from Fine Waste from the Initial Processing of Decorative Beads

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Introduction

Due to its immense geodiversity, Brazil is well known worldwide for the great array of decorative stones. The nation is a leader in the industry, and the beautiful stones it produces are used in many nations throughout the globe. Brazil exported 2.40 million t and USD 1.34 billion worth of natural stone products in 2021, respectively, up 35.5% and 11.4% from the previous year. The sales totals and yearly variation broke the previous highs set in 2013 (USD 1.30 billion and 22.8%, respectively). Brazil's top exporters of decorative stones are the states of Esprito Santo and Minas Gerais. They account for 93.2% of all export revenue from Brazil, with respective values of USD 1.10 billion and USD 132.8 million. the principal locations of these the US, China, Italy, Mexico, and the UK are the stones [1].

The raw material must be removed and processed in order to create beautiful stone cladding slabs. In the mine, a block of ornamental stones is removed from the earth during the first stage of the procedure before being delivered to the second. The slabs are sawed and polished for sale in the second step of processing. An iron grit multiblade gangsaw or a multiwire gangsaw with diamond wire can be used for sawing. During the process, fine trash is created from around 26% of the block that makes it through the beneficiated stage. The majority of these wastes are dumped in landfills, which has an adverse effect on the ecosystem [2].

Description

According to the technical standard of ABNT NBR-718, the particle size distribution of the raw material, clay, was obtained using a combined method of sieving and sedimentation by gravimetry. To estimate the dilatometry of the ceramic masses, the Netzsch DIL 402 PC equipment from the Laboratory of Advanced Materials (LAMAV/UENF) was employed. It was heated at a rate of 5 °C/min to a final temperature of 1050 °C. Two 2 g cylindrical specimens that were pressed with 1 t were created for this test. The specimens were created using masses with 0 and 50 percent FIBRO. This test's success lay in its ability to confirm the impact that the waste had on the mass's burning behaviour. Years have been spent researching the use of red ceramic objects in place of FIBRO. The waste could potentially be used in other ceramic products, thus it's critical to research the characteristics of materials and their mineral compounds as well as to gauge their mechanical and physical behaviour [3].

Other researchers continued to research the subject in the years following the century. A general overview demonstrating the utilisation of trash as an alternative raw material for ceramic manufacture was published with the aim of producing artefacts that were both economically and environmentally sound. Another study confirmed that red ceramic was substituted for the quartzite waste in ratios of 10%, 20%, and Meets the standard technological requirements for the production of solid bricks at a temperature of 800 °C and a percentage of 30%. In more recent efforts, they demonstrated that ornamental stone wastes can increase strength while partially replacing clay in the production of red ceramic objects. It was demonstrated in a different study that adding granite wastes to red ceramic objects enhances their mechanical and physical qualities.

Because the waste is incorporated into the life cycle of newly made products, the utilisation of these ornamental stone wastes in the production of red pottery helps to advance the circular economy. Along with the benefits, it also has ceramic material options. Utilizing this trash enhances the Ceramic materials created at the lowest temperatures of 900 °C and 950 °C from a composition of 30% waste already fit the minimum limit defined by the standard for their manufacture, as indicated in the results. This leads to energy savings. The multiwire gangsaw method, which uses just water for sawing and diamond wires for processing, was utilised to beneficiate the waste used in ceramics [4].

Additionally, there is waste from the multiblade gangsaw procedure, which uses steel blades, abrasive steel shoots, mud, and lime. Due to the high concentration of iron oxide in these waste materials, using abrasive steel shots might result in flaws and a black heart in the ceramic. Red ceramics production might suffer from the usage of ornamental stone waste from this process, though. All of these research demonstrate that it is feasible to create red ceramic items using ornamental stone debris. Consequently, FAPES and CETEM, and other organisations suggested creating normative guidelines for using FIBRO in red ceramic artefacts. The project standard is being worked on, and the outcomes were acceptable. The work displayed [5].

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Conclusion

In addition, it will involve the sectors involved in the circular economy, contributing to the sustainable development of the Brazilian ornamental industry. The use of these wastes, which are currently disposed of in landfills, will contribute to the development of new ecological materials with the use of FIBRO and, as a result, will contribute to the reduction in the consumption of natural raw materials and the reduction of the environmental impact generated with the disposal of waste Different studies are being conducted using granite waste in the manufacturing of other ceramic materials with high added value due to the importance of the subject and the possibility of granite waste to be utilised as a raw material in ceramics. Additionally, industrial tests are conducted creating crimson pottery utilising these leftovers.

Acknowledgement

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Conflict of Interest

None.

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