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PROCEEDINGS OF THE
IV ISSCIMM INTERNATIONAL SYMPOSIUM ON SCIENCE, INNOVATION AND MODELING IN MATERIALS

DEVELOPMENT AND TECHNOLOGICAL CHARACTERIZATION OF ARTIFICIAL AGGLOMERATED STONE PRODUCED WITH QUARTZITE STONE WASTE

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Cachoeiro de Itapemirim, maio de 2024

CAR 0001-00-24 Organized by members of the Graduate Program in Science, Innovation, and Modeling in Materials (PROCIMM) at the State University of Santa Cruz (UESC). DECEMBER 4th to 8th ILHÉUS, BAHIA. ISBN: 978-85-7455-574-4

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https://procimmuesc.wixsite.com/iv-isscimm/en

BOOK OF ABSTRACTS

4th International Symposium on Science, Innovation, and Modeling in Materials (IV ISSCIMM)
04-08 December 2023
State University of Santa Cruz (UESC)
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The fourth edition of the International Symposium on Science, Innovation, and Modeling in Materials was the first held in a hybrid format, with minicourses, lectures, and technical sessions. The abstracts of the works presented in the technical sessions, after approval by the scientific committee, make up this book, which is divided into eight main themes: i) adsorbents, water and effluent treatment, ii) catalysts, iii) construction industry: cimentitious matrices properties, iv) health applications, v) metal alloys analysis and treatments, vi) nanoparticles and nanomaterials, vii) recycle and reuse and viii) others.

The technical sessions, lectures and minicourses presented at the event can be accessed on our Youtube channel by clicking HERE or on the link below.
https://www.youtube.com/@ppgemcienciainovacaoemodel5393/playlists

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Título: Proceedings of the IV ISSCIMM International Symposium on Science, Innovation, and Modeling in Materials
ISBN: 978-85-7455-574-4
Formato: Livro Digital
Veiculação: Digital
Book editors: Prof. Marcelo Tramontin Souza and Prof. Tatiane Benvenuti
Publisher: Editora Editus (UESC)
Year: 2024

DEVELOPMENT AND TECHNOLOGICAL CHARACTERIZATION OF ARTIFICIAL AGGLOMERATED STONE PRODUCED WITH QUARTZITE STONE WASTE

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Abstract

The ornamental stone sector in Brazil has experienced notable growth and has introduced new technologies for improving or using stone materials in civil construction. However, a substantial environmental challenge is associated with this sector, mainly related to the management of waste generated in the various stages of the production process. Most of this waste is sent to landfills, which represents a significant environmental liability. To address this issue, it is essential to explore more sustainable alternatives in treating waste from the ornamental stone industry. The use of this waste to manufacture artificial agglomerated stone becomes one of the alternatives for minimizing the environmental impacts generated during extraction and processing, producing an eco-efficient material, thus contributing to the circular economy. This work aims to produce and technologically characterize an artificial agglomerated stone with quartzite stone waste commercially known as Dumont Quartzite with variation in granulometric composition. In this work, waste from the shell and processing fines (FIBRO) generated during the process of unfolding the block into sheets on the diamond wire loom equipment were used. The wastes were used in three particle size ranges (coarse, medium and fine) in accordance with ABNT 16483 (2020), where the particle size composition of the highest packing of the particles was determined using the Simplex Centroid Model method. The coarse and medium wastes came from the quarry and the fine waste came from the FIBRO. Regarding the epoxy matrix, boards with 13% resin were produced with two mixtures of higher packing. The mixtures were as follows: mixture 1 (16% coarse particles, 67% medium particles and 17% fine particles) and mixture 2 (67% coarse particles, 16% medium particles and 17% fine particles). For the production of artificial agglomerated stone slabs, the waste was mixed with the resin in three proportions of each mixture, and then a hydraulic press was used by vacuum vibro thermos compression at a temperature of 90°C for 20 minutes at a vibration frequency of 60 Hz. The compaction pressure used was 3.68 MPa. Ten specimens measuring 50 x 50 x 10mm were produced. The statistical treatment of the data was carried out using Microsoft Office Excel. The results of the technological properties with mixtures 1 and 2 containing 13% resin were respectively: apparent density (2.28 g/cm3 and 2.28 g/cm3), water absorption (0.13% and 0.30 %), apparent porosity (0.25% and 0.68%). According to Brazilian technical standards ABNT 15844(2015), water absorption must be a maximum of 0.4% and a maximum porosity of 1.0%. The stone produced with the two mixtures meet the requirements of the standard and have suitable properties for application in civil construction projects, especially in humid environments, as they have low porosity and water absorption.

Keywords: *ornamental stone waste; artificial agglomerated stone; technological characterization.*