MOULDING CERAMIC PIECES BY SLIP CASTING USING PEGMATITE RAW MATERIALS FROM POTIGUAR

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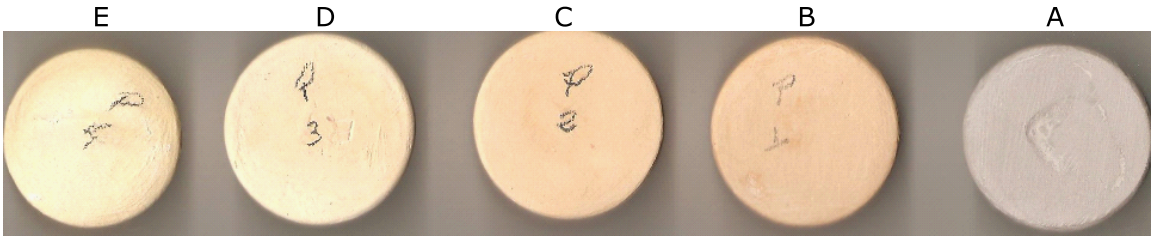
ABSTRACT

The slip casting is a manufacturing ceramic process described as the consolidation of particles of an aqueous suspension of ceramic powders (slurry) through the removal of the absorbent liquid into a mould, which is usually plaster. While this technique is old, it is necessary to develop a formulation (additive + ceramic powder moulding) appropriately in accordance with the characteristics of each ceramic powder, because if the slip is not well dispersed it may generate defective pieces with irregular walls, with impaired mechanical and structural properties after sintering. In Rio Grande do Norte, handmade ceramics show little development, their activities being restricted to the production of utilitarian objects, small sculptures and decorative red clay ware. The purpose of this study is to develop a formulation for the production of decorative and utilitarian pieces using pegmatite raw materials from Potiguar, determining the ideal composition of these components for the development of this technique with subsequent application in underserved communities for the development of regional crafts. Moreover, the focus of this project is to contribute to the sustainable development of our natural resources, adding value and developing the craft sector. In this study, all raw materials were characterized by XRD and XRF, and laser particle size analysis. The ceramic masses were mixed in a ball mill for 24 hours and, after preparation of the pieces, they went through the natural process of drying, followed by sintering at 850, 900, 1000, 1100, 1150 and 1200°C for 1 hour. The final results demonstrated that this type of activity, using local raw materials, was satisfactory and that, in addition, other natural raw materials such as carnauba, sisal, semi-precious stones and others could be added to these ceramic pieces, thus enhancing the value of RN craftsmanship.

COMPONENT	Percentage by weight
Kaolinitic clay	30,00
Kaolin	10,00
Albite	20,00
Calcite	20,00
Spodumene	10,00
Dolomite	10,00
Deflocculant	0,50

Table 1. *Sample composition.*

It was found that the use of Spodumene in replacement of and/or use in conjunction with quartz was quite interesting, mainly because of the intrinsic characteristics offered by lithium oxide, favouring a reduction in firing temperature between 100 and 150°C, in addition to improving the mechanical properties of the final product. This because the pegmatite involved is rich in raw materials, one of these being Spodumene, which is economically quite interesting.



A – Sample before sintering; B – Sample sintered at 850°C;
C – Sample sintered at 900°C; D – Sample sintered at 1000°C;
E – Sample sintered at 1100°C.

Figure 1*: Pictures of the samples before and after the sintering stage:*

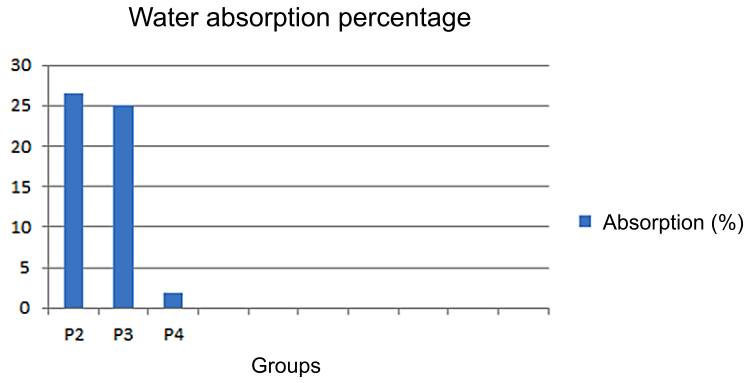


Figure 1: *Water Absorption Index.*

It was observed in the samples that, at a temperature of about 1000°C, the product was very stable and displayed appropriate characteristics for the production of ceramic pieces using the liquid phase (Slip Casting). A future proposal would seek to produce pieces of reduced thickness, with excellent mechanical strength, seeking to implement the use of Spodumene as basic feature in the formulations.

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