



## **Use of marble dimension stone industry (Alentejo, Portugal) by-products in the manufacture of ceramic pastes for traditional pottery**

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It is well known the increasing difficulty of finding out clay deposits adequate both in quality and size, able to supply the traditional pottery industry existent in the District of Évora, Portugal. To overcome such difficulty one project was planned aiming at the use as pottery raw materials of the clay-rich “terra rossa” that overlies the marble deposits that occur in the region of the Anticlinal of Estremoz, as well as other local clay-rich non residual soils, and fine grained carbonate-rich (around 99% of  $\text{CaCO}_3$ ) wastes (sludges) derived from the sawing and polishing of marble stone in local processing industrial plants. In such context “terra rossa” samples (Lagoa and Borba VV) and clay soils (sample Biblio VV) have been studied. The textural, mineralogical and chemical characteristics of the sludge materials referred to have been studied too. Along this study, the raw materials had suffered some improvement which included drying, breakdown, cutting and granulometric partition to 0.250 mm. Afterwards, some sample portions were removed for tests of physical, mineralogical and technological characterization. From the results obtained, five ceramic paste were formulated and, subsequently, subject to technological tests in the laboratory of Cencal – training centre for the ceramic industry of Caldas da Rainha. The research culminated with an industrial test on Olaria XT (traditional pottery), with the shaping of some pieces on Potter’s wheel, and subsequent evaluation.

From the technological results, it was concluded that all the studied samples showed an excellent plasticity and workability, having obtained great results during extrusion and conformation of the test pieces. Despite the low values of mechanical resistance to bending in raw, it was possible to handle the ceramic pieces without causing defects, with a substantial increase of the values with the rising temperatures of cooking up to 950 °C. The lower values of dry/cooked retraction and total retraction in this study are associated with the use of the carbonated mud. The industrial test revealed that all ceramic pastes showed excellent workability, resembling the industrial pastes, traditionally used. After the industrial test, it was also found that almost all pottery pieces were flawless with high toughness, with special highlight for the raw material Biblio VV. After all the work, it was possible to prove that technically it is feasible to apply these raw materials in traditional pottery, and the values obtained are promising, with some of them capable to compete with the results corresponding to the commercial pastes typically used.

### References:

[1] Alves, T. 2015. Formulação de Pastas Cerâmicas a partir de Matérias-Primas Argilosas dos Concelhos de Vila Viçosa e Redondo para a Produção de Olaria Tradicional. Unpublished Master’s thesis in Geological Engineering, University of Évora. Portugal, pp. 251.

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