

Characterization methodology for re-using marble slurry in industrial applications

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In the effort towards waste minimization and circular economy, natural stone waste is one of the foremost parameter to turn scientific community attention.

At this time, calcium carbonate has a great importance in industrial fields and currently there is the necessity of appreciate the potential value of marble waste and convert it into marketable products.

A large amount of residues is produced in ornamental stone sector with different dimension and particle size. The research focused on marble slurry, recovered at the end of the treatment plant in the filter-press section. The aim of this paper is to propose a defined way to characterize marble slurry, primarily composed of micronized particles, in order to obtain useful data to make a comparison with market specifications. In particular the proposed characterization methodology follows the indicated steps: Leaching test (TCLP) - Grain size distribution and bulk density - Mineralogical analyses - X-Ray diffraction - Chemical analysis - Loss on ignition - SEM determination - Colorimetric and bright analysis.

Marble slurry samples, collected by different dimension stone treatment plants in Orosei marble district (Sardinia - Italy), were analyzed by physical, mineralogical and chemical determinations and the obtained data were evaluated for compatibility with the CaCO_3 specifications required by a definite industrial sector, seeing as how CaCO_3 product specifications vary depending on the utilization.

The importance of this investigation is to characterize completely the "waste" that must apply for further uses and to identify the feasibility to substitute marketable micronized CaCO_3 with marble slurry. Further goal is to enhance the environmental advantages of re-using stone waste by reducing marble waste landfills and by applying raw material substitution, in accordance with regulatory requirements, thus pursuing the objective to convert natural stone waste into by-product with a renewed environmental and economic value.

Consequently what until now was considered as a waste, can be an important economic resource capable of promoting the sustainability.