

Evaluation of Wastes from an Aggregate Quarry of Stavros Area, Crete-Greece, in Filler Industry

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Fillers and extenders are inexpensive minerals used almost entirely to lower cost and add solids to paints, paper, rubber and sealants (Carr et al 1994). The applicability of wastes from calcitic marble quarries of Stavros area, as a source for the production of carbonate fillers and extenders is proved in this work. Apart from the financial benefits, their use would contribute considerably to the solution of environmental problems caused by the huge waste embankments disposed at this area.

The mineralogical and petrographic characteristics of these materials were determined by optical microscopy and X-ray diffraction. The chemical composition was determined with X-ray fluorescence using pressed powder pellets.

The whiteness of filler, especially of carbonate filler is the crucial quality value (O'Driscoll, M. 1990). The color was measured using a Diffusion Systems reflectance spectrophotometer with 45°/90° geometry and illuminant "A" source against a perfect white diffuser. The color parameters L*, a* and b* of the ground materials were determined according to the CIELAB system (Billmeyer & Saltzman 1981), as well as the parameter Δ*ab which is given in the BS 3900*. Other characteristic physical properties were also determined are particle size analysis, oil absorption value, surface area, pH of aqueous suspension and the solubility.

The materials are medium to coarse grained marble with calcite as the main mineral component. They show an interlocking mosaic texture with coarse grained calcite crystalloblasts. All the examined samples are high to very high purity carbonate rocks with CaCO₃ greater than 97%. The insoluble residue is under than 1%, and all samples have high CaO content and low SiO₂, Al₂O₃ and Fe₂O₃ and their composition does not display significant variations. The values of the results of the physical properties of the examined samples come within the different European standards. Their whiteness is around 90%. However the color of white carbonate minerals produced by grinding becomes whiter as particle size decreases (Repouskou 2001). Finally is emphasized that all materials are suitable as filler raw materials in industries where color is not important.

References

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