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Use of Marble Dust/Sludge as Partial Replacement Material of Cement/Sand in Concrete & Mortar

Marble powder/sludge is an industrial waste resulting from cutting, shaping and polishing of Marble. Industrial waste management is one of the major environmental problems, therefore, recycling and reuse of industrial wastes will play vital role both in resolving industrial waste problem and in getting benefit from it. Utilization of marble dust/sludge in the production of new building materials can conserve the limited natural sources and will also help protect environment. In this experimental study, the usability of marble dust as partial replacement of cement in mortar and concrete and also as complete replacement of sand both in mortar and concrete has been investigated; their compressive strength and modulus of rupture determined and so is the cost. It was confirmed through XRD & SEM analysis that Marble Dust/sludge has no Pozzolanic properties, but through experimentation it was observed that it shows good workability as slum is comparable to control cement samples but it shows slight increase with increase in marble content. The study reveals that marble dust/sludge up-to 15% can be replaced in mortar whereas in concrete cement can be replaced up-to 10% without compromising the strength. The study also reveals that sand replacement up to 80% increases the compression strength of both mortar & concrete. It was also observed that there is an increase in compressive strength for both cement & sand replacement with the passage of time, probably due to the development less shrinkage cracks during setting, or may be due to the filler effect of marble powder attributed to the fact that the lower fineness modulus enhances the cohesiveness.

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