

A New Technology of Marble Slurry Waste Utilization in Buildings.

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Abstract - Marble slurry dust (MSD). A waste material of marble industry. Is being used in different type of building works. Here in this the author has used around 20- 30% of marble slurry and waste replacing cement etc. in mortars and concretes etc. It not only reduces the cost not on the cost of marble slurry but results in good strengths also. Technology has been validated by taking different trial tests in the field.

Key Words: Marble slurry dust (MSD). Mortar. Building works.

1. INTRODUCTION

The ever increasing popularity of the marbles of Rajasthan, growing demand for finished and unfinished products, discovery of new marble deposits and growing private and public supports have led to a significant growth in Marble Industry of this State. As a result, number of marble quarries as well as marble processing units has significantly gone up mainly during last one decade. However, whereas there is significant growth in production of finished and unfinished marble products, there is also simultaneous development in waste generation as well; thereby causing nuisance in environment affecting health of the society.

Marble in Rajasthan is 90% of the total reserves in India. It is available and mined in Ajmer (Marana), Rajsamand, Udaipur etc. The mining operations creates considerable wastes of the order of 55%. The distribution of waste can be assessed as mine waste 50% , processing waste 5% .Thus the main product ,marble is only 30% for utilization. Processing in gang saws, marble block produce marble slurry, a fine white powder and a waste which is subsequently disposed on agricultural fields fertile

or barren, pasture lands, river beds, road sides, empty lands and catchment areas.

According to estimation there are 1100 gang saws operating in Rajasthan. In gang saws about 30% of marble blocks are converted into powder and it is about 1.5 million tons per annum. Total Requirement of water in the processing plants is about 2, 75,000 liters per hours.

Water gets badly polluted during processing. A 'filter press' is a key component in the eco-friendly for marble processing .The amount of water ,which is otherwise disposed around the processing plants is saved and can reused and recycled in further processing Can reused and recycled in further processing.

Chemical analysis of marble slurry waste from Gang saw/circular Saw/ Block cutter Processing units installed at Jaipur	
CaO %	32.80
MgO%	1.080
R ₂ O ₃ %	2.65
Acid Insoluble %	14.38
Loss on Ignition	39.35
Total	99.98

Concrete Mix Proportion

	Material by Weight				
	M%	C(kg)	S(kg)	W.M. (kg)	C.A. (kg)
M30	0	423	527.0	0.0	1272
	5	423	500.6	26.3	1272
	10	423	474.3	52.7	1272
	15	423	447.9	79.0	1272
	20	423	421.6	105.4	1272

M=Marble, C=Cement, S= Sand, W.M. =Waste Marble, C.A. = Coarse Aggregate

Source: Baboo Raj Khan Naushad H, Tabin Rushad S, Dugal S.K Motilal, "Influence of Marble powder/granules in concrete mix" Nehru Institute of Technology, Allahabad.

2. METHODS AND METHODOLOGY

Physical and chemical properties

i)

Atterberg limits :- The plasticity of marble slurry along with shrinkage limits were determined according to ASTM D 4318 -00 – Liquid limit and plastic limit and ASTM D 427-98 – Shrinkage factors of soil by the mercury method .Marble particles are non-plastic materials with shrinkage limit as a percentage of dry mass of 23.20 for marble slurry and shrinkage ratio of 1.50.

ii)

Grain size of marble slurry was determined by sieve size analysis according to ASTM C136 01 .Marble

particles grain size were determined by wet analysis by hydrometer according to ASTM –D 422-63.

Shear strength characteristics of soil with marble dust

The direct shear conducted on soil by adding a specific percentage (10%, 20%, and 30%) of marble dust by weight of soil and mixed with optimum moisture content obtained from compaction test without curing the specimen. The result revealed that the addition of 30% of marble dust has increased the angle of friction by about 48% and reduced cohesion by about 62%.

The test was conducted on characteristics of pond ashes mixed with marble dust and various properties were investigated. The physical and chemical properties of marble dust were investigated in the laboratory. Under consolidate undrained triaxle shear test ,it was observed that an addition of marble dust " ϕ " value increases but there was no change in original zero value of 'c'.It was also observed that ϕ value increases linearly by addition of lime upto 8% but increases quite significantly at 10%.

CBR characteristics of soil with marble dust

From the constant tests it is determined that CBR% increases upto addition of 20% MSD in soil and then reduces on further addition of MSD %.It is concluded that the effect of mixing of MSD upto 40% with soil resulted in minor changes in plasticity of soil but load bearing capacity of soil was improved. Dust make the soil slightly cohesive and result in better compaction.

3. CONCLUSIONS

To effectively utilize these wastes as a raw material, filler ,binder and additive in developing alternative building materials .In order to maximize the use of alternative building material developed from different types of solid waste and to increase the production capacity of lab scale processes, technology enabling centers are needed to be set up to facilitate entrepreneurs for effective commercialization.

Durability and performance of newer products and disseminations of technologies emphasizing cost benefits analyses and life cycle assessment report will significantly contribute to successful commercialization of innovative processes.

REFERENCES

- 1 MNIT (Jaipur) Research communication on “use of marble slurry for soil stabilization.
- 2 IS; 2720-1985 (PART 4)“Method of test of soil: grain size analysis”, (BIS.New Delhi) 1985.
- 3 Personnel discussion with authorities concerned with marble slurry.
- 4 Inspection of slurry dumping ground.
- 5 Consultation with marble processing gang saws unit in Rajasthan.
- 6 Research paper on “Solid waste generation in India and their recycling potential in building materials” by Ashokan pappu etc.