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Utilization of "Marble Slurry" In Cement Concrete Replacing Fine Agreegate

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***Abstract**: The wastage of marble industry are responsible for many environmental problems because 70% wastes and only 30% recovery of main product contribute to the maximum wastes which are indestructible. Dumping sites give dirty look. Contaminate top fertile soil cover, along with rivers/water bodies affecting irrigation and drinking water resources and air as well as loss to flora and fauna.*

The most efficient Solution of marble slurry pollution is utilization in Bulk. The only industry which can consume marble slurry at so large level is only the construction industry. Different properties of marble slurry determined in the laboratory. Sp. gravity 2.61, Fineness modulus was found to be 0.91 and Utilization of marble slurry in Cement Concrete replacing Sand is 30% which shows equal strength as of Control i,e. 1:2:4 Cement Concrete 0% Marble slurry. Marble slurry can be easily utilized in construction industry in preparing Cement Concrete.

***Key words:-** Cement Concrete, Fineness modulus, Marble slurry, Specific gravity.*

I. Introduction

Marble occur abundant in nature. It is used and mined many places in the world since early time. Around 90% of the world's production of marble comes from India and approx 85% of India's production is received from Rajasthan and almost all mining and processing activities are concentrated around **Makrana**, where the proposed study is planned to undertake. Rajasthan has more than 4000 marble mines and about 1100 marble gang saws (processing units). At the same time it leads to growth of many processing units in respective areas. These two activities in Rajasthan have been extended in 20-25 years and have played important role in the economy of the state providing direct and indirect employment to majority of people and therefore also raising their living standard.

The industry involves mining and processing units for the production of tiles for walls and floors, articles, waste production and other ancillary works. The marble mining and the industry as a whole are different from other industries to the ver y fact that, the marble is a "Dimensional Stone", which means the stone is sold by size not by weight (In other words in sqm not by tonnes). Since the selling price increases manifolds with size, all the operations involving mining and processing are aimed to get slabs as big as possible.

Marble slurry generation:-

Marble Slurry is a suspension of marble fines in water, generated during processing and polishing, etc.

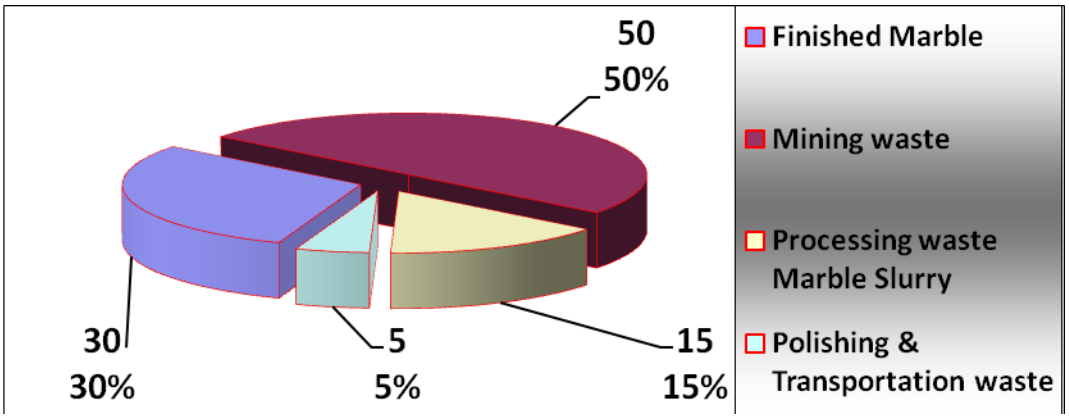
Environmental Hazards due to waste.

It is shaping to major threat of the Environment in the state by mining and processing activities. Nearly one thousand Gang saws and thousands of cutters are producing 15-20 lac tons of marble slurry waste which is indestructible waste and harm to general Public. Some of effects of the marble slurry may be listed as under: -

1. The waste is indestructible.
2. The sites which can be used as dumping ground are limited and gives repulsive dirty look.
3. Contamination of top fertile soil cover.
4. Contamination of the rivers and other water bodies there by adversely affecting irrigation and drinking water resources.
5. Contamination of air.

Public resistance, Law & order and prevention (Banning) can give a deathblow to the growth of the marble industry. It is therefore a social responsibility of Public, and scientific & engineering responsibility of government and industry to solve the problem of marble slurry pollution.

Fraction of Total Marble Production : -



However, the development of country is only possible by sustainable and balanced industrialization.

(a) Conservation of Natural Resources.

The valuable national wealth is getting wasted mainly due to lack of management and technology. This waste, if used, can change perhaps the entire scenario of the industry.

(b) Air pollution.

This is the most hazardous impact of the marble industry. It is clear from the table 1, slurry is produced at almost every operation and it is a great problem. When it gets dry, it causes air pollution and related problems.

(c) Water pollution.

Like any other industry, the marble industry needs water in its different operations for cutting, cooling and flushing. In these operations water gets contaminated by marble slurry.

(d) Visual impacts.

Abandoned mines, dumping sites, slurry waste sites, deposition of dried slurry over almost every structure in surrounding areas gives a very bad, dirty look and aesthetic problem.

(e) Accidents due to unscientific dumping.

(f) Dry Slippery road

Due to dumping of mine waste and marble slurry on road side causing dust in air(polluting air) and creating less visibility, due to less visibility number of accidents occurs.

(g) Wet slippery road

In raini season marble slurry flows over road. Due to marble slurry road becomes slippery and many accidents takes place.

(h) Loss to flora & fauna

Already grown trees and bushes die out and new ones do not grow due to deposition of marble slurry. Animals also suffer for their food and shelter.

II. AIMS AND OBJECTIVES:-

Utilization of the Marble slurry is the only complete solution of the Marble slurry Pollution. For this purpose the most useful steps can be:

(A) Re-utilization of water after separating the Marble slurry.

(B) Utilization of Marble slurry.

(A) Re-utilization of water after separating the Marble slurry.

Proper separation of water is essential. 5000,000 tons slurry is generated annually which contains 4000,000 tons of water. Hence an effort should be made to get the maximum possible water out of it and slurry be converted in the form of cakes. These cakes can far more easily be transported for utilization at distance sites. This will help in saving the natural resources of water and also the sand lowering the damage to eco-system.

(i) **Natural process:-** Naturally separating water from marble slurry by settling process and drying in different settling and drying tanks separated water will available for reuse.

(ii) **Mechanical process:-** In this process by a mechanical filter press water is separated and cakes of slurry are formed and dried in air.

(B) Utilization of marble slurry:-

Even minimizing waste/slurry production the problem could only be partially solved. Therefore it is needed to develop modes of utilization of waste/slurry. Since other applications cannot consume such a bulk amount of slurry, efforts are being made to utilize slurry for different civil works.

It is essential to explore possibilities of alternative uses. To arrive at technically sound and financially viable technologies to utilize marble slurry / waste and also work out a framework for long term waste management in Industrial Areas.

The areas where the utilization of marble waste and marble slurry needs to be explored as a substitute for conventional raw materials are as follows:

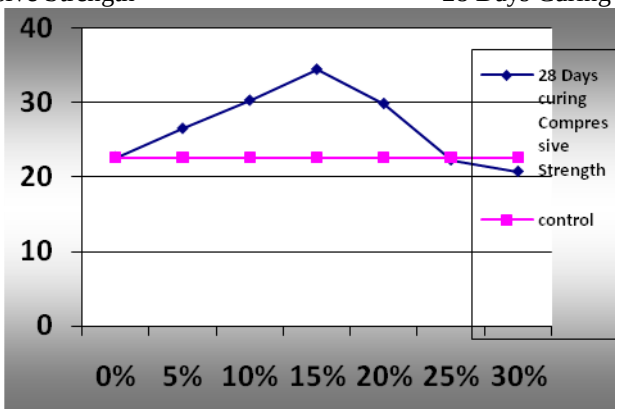
1. **As a filler material for roads and embankments**
   (As per Khadi Board of India ItemNo 31 from sr no. 1 to 9 of this chapter**)**
2. **For manufacture of bricks**
   Central Brick Research Institute (CBRI), Roorkee.
3. **Manufacture of Portland Cement**
4. **Manufacture of Ceramic Tiles**
5. **Manufacture of Thermoset Resin Composites**
   The Macromolecular Research Centre at Jabalpur.
6. **Manufacture of lime**
7. **Manufacture of Activated Calcium Carbonate**
8. **Hollow Blocks and Wall Tiles**
9. **Manufacture of Ground Calcium Carbonate**
10. **Making Cement mortar (Partially replacing sand)** and
11. **Making Cement concrete (Partially replacing sand)**.

Properties of marble slurry:-

a. Colour	White.
b. Texture	Powder.
c. Taste	None
d. Particle Size	4.75mm-75micron
e. Fineness Modulus	0.91
f. Natural moisture content	0%(if under roof)
g. Solubility in Water	Totally in soluble.
h. Densification	Lesser (Compare to Cement)
i. Specific gravity	2.56

11.Optimum quantity of Marble slurry for same strength as of Control for M20 Cement Concrete Without distorting standard designed mix. Many researchers made their efforts distorting standard design mix.

Compressive Strength 28 Days Curing



Slurry Mixed

III. Conclusion based on Examination

AS per results of Practical examination this material Marble slurry shows a good and acceptable strength when added in Cement Mortar and Cement Concrete Both (replacing sand). It can be used as a filler material (upto 30% replacing sand) showing same strength as of controll.

IV. Acknowledgement

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References

[1] Ameida, N, Branco, F. &Santo, J.R.(2007, "Recycling of stone slurry in industrial activities: Application to concrete mixture". Building and environment, 42 (2007) pp810 - 819 Portugal (IST).
[2] Fakher J. Aukour "Incorporation of Marble Sludge in Industrial Building Eco-blocks or Cement Bricks Formulation" 1) Faculty of Natural Resources and Environment, The Hashemite University, Zarqa, Jordan,
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[4] Jordan Journal of Civil Engineering, Volume 3, No. 1, (2009).
[5] Hanifi Binici, Hasan Kaplan and Salih Yilmaz, "Influence of marble and limestone dusts as additives on some mechanical properties of concrete"Scientific Research and Essay Vol. 2 (9), pp. 372-379, (2007).
[6] H. Binici, H kaplan. And S. Yilmaz 'Influence of marble and limestone dusts as additives on some mechanical properties of concrete', Scientific Research and Essay, Vol.2 (9), 372-379, Full Length Research Paper (2007).
[7] Karasahin, M. and S. Terzi, "Evaluation of marble waste dust Mixture of asphaltic concrete". Construct. Build. Mater., 21: 616-620. (2007).
[8] Mathur R, Misra A K & Goel P, "Marble slurry dust and wholastonitenert mineral admixture for cement concrete"Indian highway (2007).
[9] M. Belachia and H. Hebhoub, "Use of the Marble wastes in the Hydraulic Concrete" 6th International Advanced Technologies Symposium (IATS'11), (2011).
[10] M. E. TAWFIK, S. B. ESKANDER, "Polymer Concrete from Marble Wastes and Recycled Poly (ethylene terephthalate)" Journal of Elastomers and Plastics (2005).
[11] Rania Hamza, Salah El-Haggar, Safwan Khedr, "Utilization of Marble and Granite Waste in Concrete Bricks" International Conference on Environment and BioScience IPCBEE vol.21 (2011).
[12] Valeria Corinaldesi, Giacomo Moriconi, and Tarun R. Naik, "Characterization of marble powder for its use in mortar and concrete" For Presentation and Publication at the CANMET/ACI Three-Day International Symposium on Sustainable Development of Cement and Concrete, October 5-7, (2005).