



# Marble Sludge Waste Raw Material Is Useful in Various Academic and Industrial Fields

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**Abstract:** Rajasthan is the richest state in the country with regards to marble deposits (1100 million tons) both in quality & quantity. Around 4000 marble mines and 1100 marble processing units, spread over major Districts of Rajasthan.<sup>1,8</sup> Marble processing units all over the Rajasthan are generating around 5-6 million metric tons of slurry every year. To manage this huge inorganic & non-hazardous waste in gainful/productive use and options were explored. However, due to Government orders on control of environmental pollution & public awareness, these kinds of activities have reduced & now the local Marble Associations have identified the disposal sites and the generated slurry is being disposed through tankers at identified sites without spilling out on roads.<sup>4</sup> To access the slurry management options, a preliminary survey was conducted during 13th May to 23rd May, 2021 at Kishangarh, Rajsamand, Makrana, Udaipur and Chittorgarh regions of Rajasthan. The survey followed by an interaction meet on Marble & Marble Slurry Disposal: Problem, Issues & Probable Solutions' at Kishangarh (Rajasthan) along with the representatives of Marble Associations, Cement industries & marble processing units.

Keywords: marble, slurry management, non-hazardous, environmental pollution, disposal etc.

## Introduction

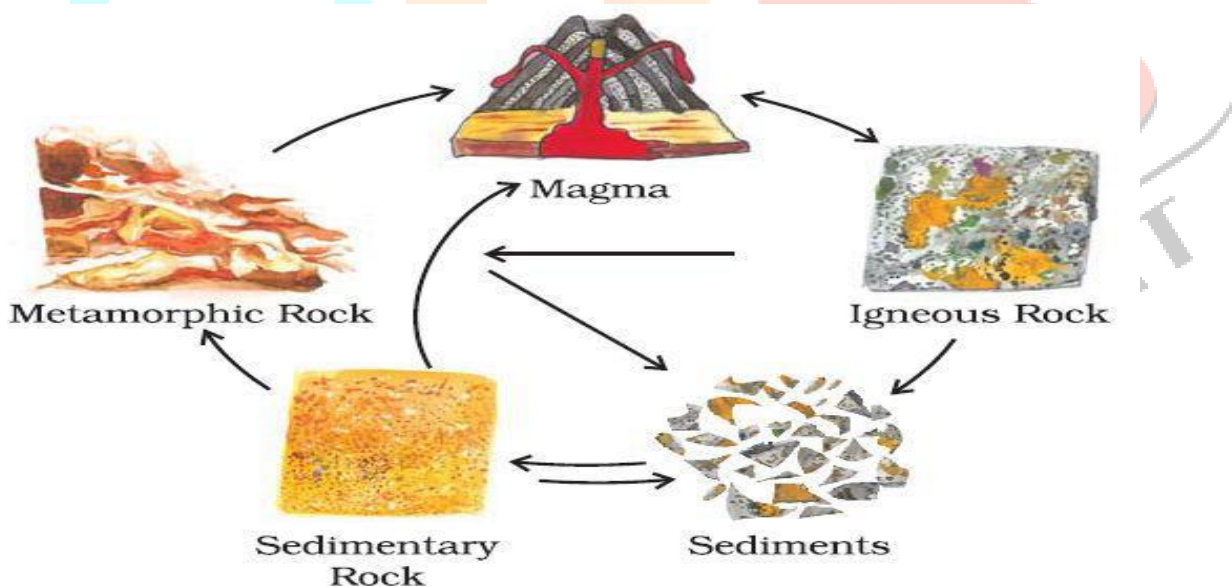
Marble waste is formed as a slurry, which is then passed by drains and dumped in open land regions. The piled marble trash pollutes the air and water, causing harm to animals, plants, and humans.<sup>1-3</sup>

Marble, granules of limestone or dolomite (i.e., rock composed of calcium-magnesium carbonate) that has been recrystallized under the influence of heat, pressure, and aqueous solutions. Among the different types of rocks, marble is the most widely used rock. The principal use of marble is found in architecture & sculptures.<sup>4</sup>

- Buildings and Sculptures
- Construction Aggregate
- Whiting
- Soil Treatment
- Neutralizing Acids
- Animal Supplements



In terms of geological definition 'it is a metamorphosed limestone produced by recrystallization under thermal condition and also regional metamorphism.' Marble is a rock resulting from metamorphism of sedimentary carbonate rocks, most commonly limestone or dolomite rock. Metamorphism causes variable recrystallization of the original carbonate mineral grains.<sup>5</sup> The purest calcite ( $\text{CaCO}_3$ ) marble is white in colour. Marble containing hematite ( $\text{Fe}_2\text{O}_3$ ) is reddish in colour whereas limonite ( $\text{FeO}(\text{OH}) \cdot n\text{H}_2\text{O}$ ) containing marble is yellow in colour. The green colour of marble is due to contains of serpentine ( $\text{Mg, Fe}_3 \text{Si}_2 \text{O}_5 (\text{OH})_4$ ).



## Results and Discussions

Marble slurry dust (MSD) can be utilized in mass amount productively in street development bring about saving of soil and saving of cost of Natural material soil besides Assurance of environment. The marble slurry was blended in with soil, test at a proportion of 0-30%. Variable of Safety.25% blended marble dust-based soil test is endorsed for working of building of road embankments. Proposal to the utilization of marble dust in geotechnical construction.10% of marble sludge to untreated (control) soils yields the most palatable outcomes among different rates of marble dust. It was shown that adding marble sludge to soft soils altogether expanded the maximum dry Density (MDD) when the outcome contrasted with untreated soils. Soils blended in with 10% of the marble dust offered the most elevated increment of MDD and subsequently is less inclined to deformity. The soil Modified with 25% marble dust yielded the highest value of the CBR. The nomenclature of marble is based on the mining range and colour & texture of the marble. Makrana has various mining

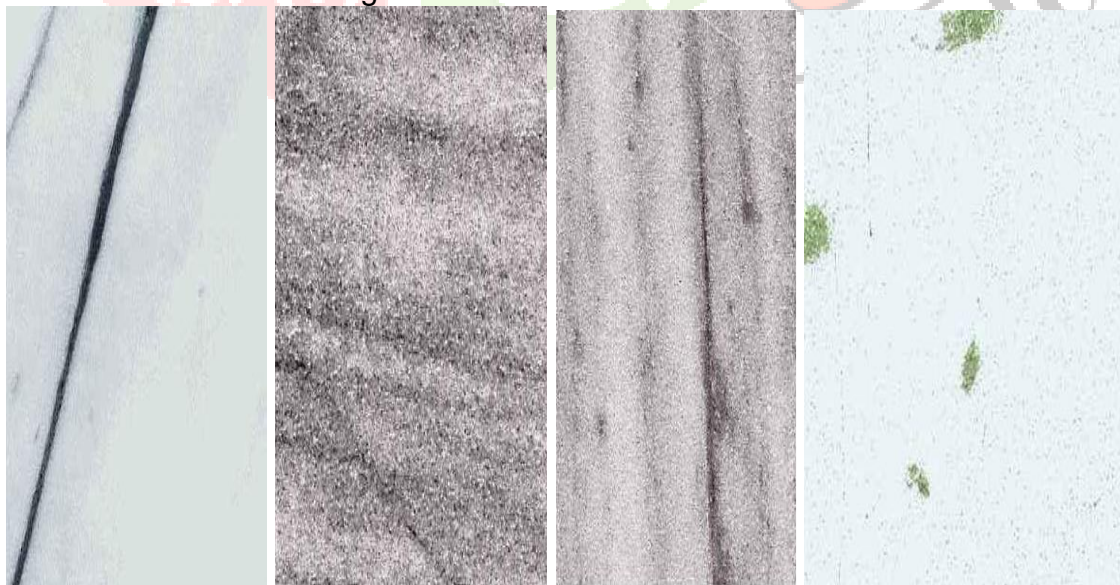


ranges, popularly known as Doongri, Devi, Ulodi, Saabwali, Gulabi, Kumari, Neharkhan, Matabhar, Matabhar kumari, Chuck doongri, Chosira etc. Doongri, Devi, Saabwali, Ulodi, Chosira and Neharkhan are famous for white marble, whereas Ulodi is famous for Albeto Marble. These mines produce white-brown marble. Gulabi stands for pink plain and pink Adanga marble whereas almost all mines produce Adanga marbles with brown and grey sheds. The marble used in 'Tajmahal' was mined at Makrana & was white in color so the marble variety was named 'Makrana White Marble'. Following are few varieties of marble:<sup>6,7</sup>

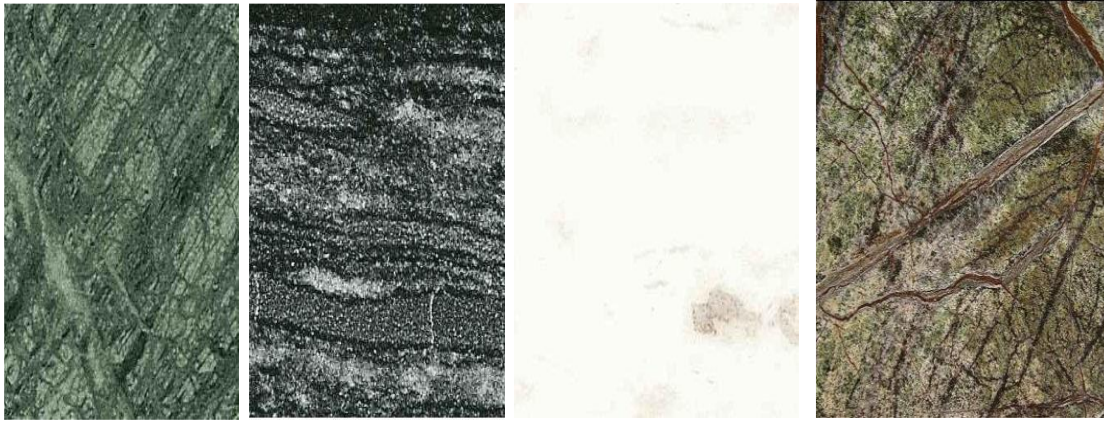
Bhainslana Black    Fancy Churu    Brown    Jaisalmer Yellow    Jhiri Onyx



Makrana Albeta    Makrana Doongari    Makrana Kumari    Andhi Indo



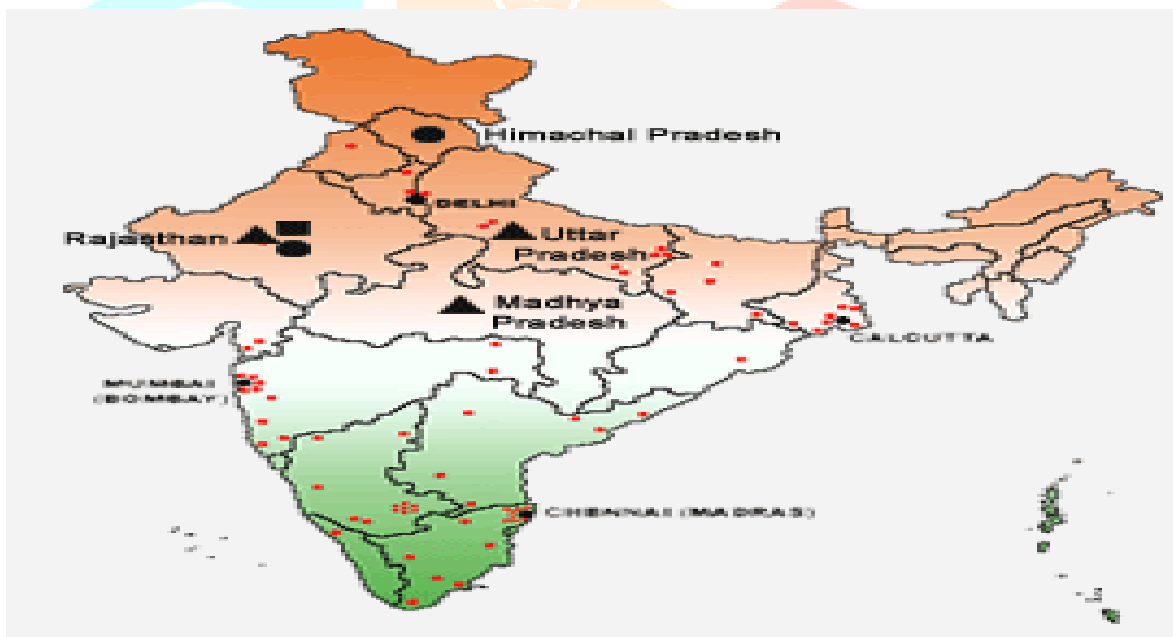
Keshariyaji Green    Sea Rampura Black    Morwar    Fancy Green Bidasar



### Major Marble Sludge Producing Areas in Rajasthan.

There are about 4000 marble mines (1200 Cutters) in Rajasthan state alone. Quarries of mines are in operation at various regions of Makrana (Nagaur), Kishangarh, Morwad area, Rajnagar (Rajsamand), Andhi (Jaipur), Salumbar, Jaisalmer, Bidasar (Churu) etc

Rajasthan has more than 95% marble processors. Important processing centres in the State are Makrana, Jaipur, Alwar, Ajmer, Udaipur, Nathdwara, Rajsamand, Abu Road, Banswara, Chittorgarh and Kishangarh



Rajasthan state generates 6 million tons Marble Sludge annually. The major areas are in the districts of Udaipur, Rajsamand, Banswara, Dungarpur, Jaipur, Sirohi, Bhilwara, Ajmer, Bundi, Alwar and Pali.

- Marble Sludge is dumped in any vacant space or empty field near the marble processing industries though official areas are marked by the state government.
- In Kishangarh, the sludge deposition area around 2.6 Sq Km. and increasing day by day.
- The Sludge environmental hazards as air pollution spreads. In the dry season, the sludge dries up mixes with wind and deposits on vegetative landscape.
- Creates necrotic ecological conditions for flora and fauna changing landscapes and habitats.
- The sludge also contaminates the soil and underground water resources Agriculture Fertility of land is seriously affected



So, by dumping these wastes to the land may cause environmental problem and also effect the fertility of the soil. Therefore, the scientific and industrial community must take responsibility towards more sustainable practices. There are many reuse and recycling solutions for industrial bi-product both at an experimental and in practical application. The physical, chemical and mechanical properties of the waste are studied.

To manage this huge inorganic & non-hazardous waste in gainful/productive use, options were explored. Various stages/options of utilization of marble slurry are as below:

- Utilization of marble slurry in cement manufacturing
- Utilization of Marble slurry dust (MSD) in road construction
- Utilization of Marble slurry as a Low-Cost Binder
- Utilization of marble slurry in brick manufacturing
- Utilization of marble slurry powder in mineral grinding plants

## Conclusion

About 1100 marble processing units all over the Rajasthan are generating around 5-6 Million Metric Tons of slurry every year. To manage this huge inorganic & non-hazardous waste in gainful/productive use, options were explored. Marble slurry dust (MSD) can be utilized in mass amount productively in street development bring about saving of soil and saving of cost of Natural material soil besides Assurance of environment The feasibility of above options needs to be examined in detail in consultation with the various organization/institutes/industries like Cement manufacturer, NCBM, CRRI, CDOS etc to evaluate most techno-economical & viable solution/option of slurry disposal. After literature review study need to research further on Marble sludge due to huge abundance of waste marble sludge waste in nature.

So, in recent year considerable amount of work has been done to find out proper solution for wastage of marble sludge. Its availability hinders the human health and environment point of view. Utilization of marble sludge in various applications like manufacturing of cement, roads, concrete, bricks etc. to recover the adverse environmental effects of marble slurry waste product. Its need to research work more in academic and industrial utilisation where consumption ratio is high.

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