

Development of Value Added Products Utilizing Kota Stone Waste

Stone has been commonly used for various purposes like flooring, cladding etc. as a building material since the ancient times. Stone industry generates both solid and stone slurry waste. The solid waste results from the rejects at the mine sites or at the processing units whereas stone slurry is a semi liquid substance consisting of particles originating from the sawing and the polishing processes and water used to cool and lubricate the sawing and polishing machines.

Kota and Jhalawar districts of Rajasthan have been subsisted with about 100 million tonnes of splittable type of decorative grade flooring limestone, known as Kota stone. It is also deposited in Ajmer, Sawai-Madhopur, Rajsamand, Udaipur, Banswara. The year wise production of Kota stone is almost continuously increasing. The average yield of acceptable quality of Kota stone per hectare land area is about 1 lakh MT and with the current trend of yearly production level 55 to 60 hectare land is brought under stone mining each year. Every year about 2.50 to 3.00 lakh MT of stone polish is discharged into local convenient place which poses major environmental and ecological problems besides occupying a large area of land for their storage or disposal. Looking to such huge quantity of wastes as minerals or resources, there is a tremendous scope for setting up secondary industries for recycling and using such solid wastes in construction materials.

So, by keeping this in mind the engineering properties of Kota stone waste has been studied and utilization of this waste as replacement of fine and coarse aggregate of size ≤ 4.75 mm (F.M. 2.5) has been done to develop flooring tiles meeting the specifications of IS:1237 and light weight blocks as per IS:2185 (iv).

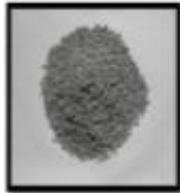
It has been found that the utilization of high volumes of Kota stone slurry waste (bulk specific gravity 2.73 and fineness 275 m²/kg) in lightweight concrete leads to higher strengths than that of normal lightweight blocks without Kota stone waste. The work has been done to produce lightweight foamed concrete with a given design targeted density of 800 and 1000 kg/m³ as per IS code that can be classified for non-structural applications. The decreased density reduces the self-weight, foundation size and construction costs. Non-structural lightweight foamed concrete generally used to reduce dead weight of structure as well as to reduce the risk of earthquake damages to a structure because the earthquake forces that will influence the civil engineering structures are proportional to the mass of those structures.



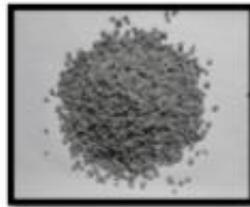
Dumped Kota stone waste



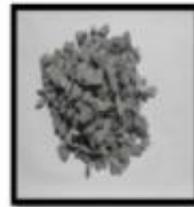
Size < 4.75 mm



Size 10-4.75 mm



Size 12.5-10 mm



Size 20-12.5mm

Different fractions of Kota stone waste



Different value added products made by Kota stone waste