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Increasing the Compressive in Concrete with Partial Replacement in Cement by Sea Shell Powder

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Abstract: This study reports the results of evaluating the use of sea shell powder from egg production industry as the partial replacement for the ordinary Portland cement. It is used to the alternate of cement which the shell is made of calcium. The cement is partially replaced with the sea shell powder as 5, 10 and 15% by weight of cement. The results of a compressive test are been recorded.

Key words: Sea shell powder, compressive, Portland, cement, egg production, India

INTRODUCTION

Seashell powder: The sea shells are currently using up large in amount for landfills and many purposes (Fig. 1). If those can be used in the concrete mixes, it may get active and environmental impacts. A mechanical property of seashell concrete is presented by Olivia *et al*. (2015). There is many industries waste are also can use as admixtures like fly ash, etc. The aggregates can also partially replace with many waste shells in the oceans. Experimental study on partial replacement of coarse aggregate by seashell and partial replacement of cement by flash is discussed by Bharathi *et al*. (2016). If these shells are added or replaced the strength with increasing as well as to the environmental. The shell has the crystalline shape in the form of calcium carbonate in it. A partial replacement for coarse aggregate by sea shell and cement by lime in concrete is discussed by Yuvaraj (2016).

After much preliminary research, the sea shell has chosen for this replacement. Other types of shells that could have been used in various usages according to their physical and chemical properties. Feasibility of using sea shells ash as admixtures for concrete is discussed by Etuk *et al*. (2012). The shell is composed of Calcium Carbonate ($CaCO_3$). Calcium carbonate is usually used filler in an application as polymers. By adding the $CaCO_3$ to polymer resins such as the polyester coating materials that act as the fire resists and enhance against the chemical and heat corrosion. It is cost effective and readily available. A partial replacement for coarse aggregate by sea shell and cement by lime in concrete is introduced by Yuvaraj (2016).

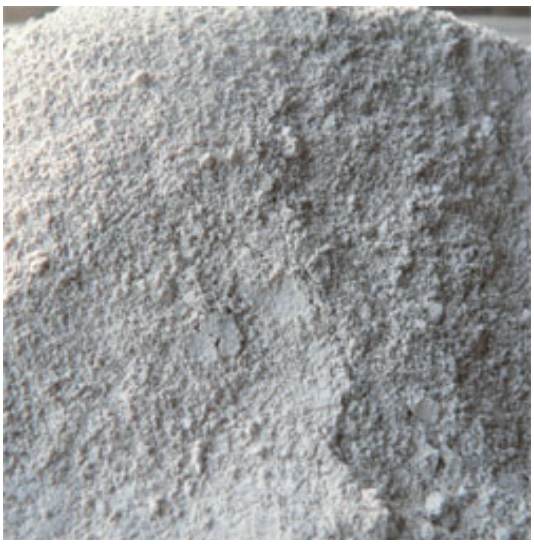

Fig. 1: Sea shell powder

MATERIALS AND METHODS

Oyster shells are also used to help aid in construction. The quicklime is also obtained from oyster shells. Effect of land and shallow water aerobic exercises on selected physiological and biochemical variables of the obese adult is discussed by Kamalakkannan and Kumar (2014). This lime is used as the mortar mixtures called tabby. Currently, the oysters are used in commercial industries are limited. Other common uses are involved using crushing the shells as the drive pavement material. Improving recovery by altering wettability from oil-wet to surfactant wet is discussed by Julius *et al*. (2015).

The compressive strength of the shells is equivalent to the stone used as aggregate in the concrete. Replacing the sand with the shells could provide a way to reprocess

Fig. 2: Compressive testing

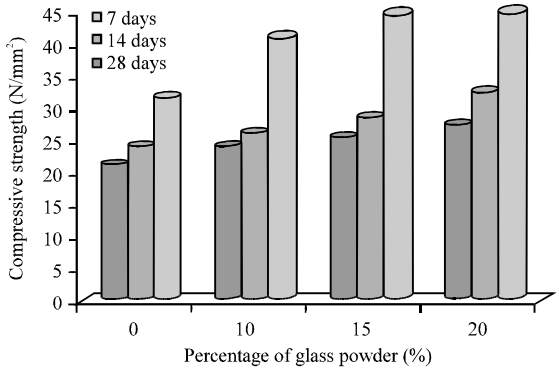

Fig. 3: Similarity of compressive strength of cubes

Table 1: Test results compressive strength on cubes

	Average compressive strength (N/mm^2)			
		Sea shell powder concrete (%)		
Curing	Control concrete	5	10	15
7	20.44	23.72	24.86	27.30
14	24.77	25.90	28.32	32.97
28	31.61	40.67	44.47	44.59

the tank waste instead of throwing it away. An easy way to judge the compressive strength of the shells and the aggregate is to make actual samples and to perform the compression test on each sample.

Compressive strength: The compressive force of a cube is done Fig. 2 and 3 by different percentages (5, 10 and 15%) at the curing days of 7, 14 and 28 days. Table 1 then the standard conventional concrete is compared with replaced concrete. The results are recorded according to the percentages and the graphical representation shows the compressive strength of the sea shell powder.

RESULTS AND DISCUSSION

The increase in compressive on the concrete by the percentages are shown in Fig. 3 according to their crushing values.

CONCLUSION

The concrete was prepared for the M25 grade of concrete on the partially replacement on the cement with the sea shell powder with the different percentages of 5, 10 and 15% and the specimens were cast according to 7, 14 and 28 days and then tested. From the above results following conclusion were made:

- The 20% achieves the maximum flexural strength for partial replacement of cement with sea shell powder is found to be greater than the conventional concrete
- It reached maximum compressive strength when there is the partial replacement of cement with sea shell powder (20%)
- So, the maximum percentage of replacement of sea shell powder is 20%

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