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Studies on Effect of Industrial and Envirnoment Waste Material on Paver Blocks

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***Abstract*— Concrete paving blocks are ideal materials on the footpaths and roads for easy laying, better lookand finish. In this paper, the issues of environmental and economic concern are addressed by the use of copper slag as partial replacement of fine aggregates in concrete. Fine aggregates were replaced by copper slag as 10,20,30,40,50 percentages by weight for M-25 mix. The copper slag material used was obtained waste collectors. The study indicated that copper slag can effectively be used as fine aggregate replacement (up to 50%) without substantial change in strength. The recycled or the demolished coarse aggregate will be replaced the aggregate in the concrete. The concrete specimens were tested for compressive strength and water absorption at 7 ,14 and 28 days of age and the results obtained were compared with those of normal Paving block.**

Keywords - concrete, copper slag, paving blocks

I. INTRODUCTION

Concrete is the man-made material widely used for construction purposes. The usual ingredients in concrete are cement, fine aggregate, coarse aggregate, and water. It was recognized long time ago that the suitable mineral admixtures are mixed in optimum proportions with cement improves the many qualities in concrete. With increasing scarcity of river sand and natural aggregate across the country, researches began cheaply available material as an alternative for natural sand. Utilization of industrial waste or secondary material has increased in construction field for the concrete production because it contributes to reducing the consumption of natural resources.

In India, there is great demand of aggregates mainly from civil engineering industry for road and concrete constructions. But, now days it is very difficult problem for availability of fine aggregates. So researchers developed waste management strategies to apply for replacement offine aggregates for specific need. Natural resources are depleting worldwide while at the sametime the generated wastes from the industry are increasing substantially. The sustainable development for construction involves the use of nonconventional and innovative materials, and recycling of waste materials in order to compensate the lack of natural resources and to find alternative ways conserving the environment.

Composition of Concrete

There are many types of concrete available, created by varying the proportions of the main ingredients below. In this way or by substitution for the cementitious and aggregate phases, thefinished product can be tailored to its application with varying strength, density, or chemical and thermal resistance properties.

- MATERIALS AND METHODS

The properties of concrete both in fresh and hardened state depend largely on the properties of constituent materials used for its preparation. Detailed characterization tests were conducted in the laboratory to evaluate the required properties of the individual materials. The relative quantities of cement, aggregates, copper slagand water together, controls the properties of concrete in the fresh state. The compacting factor was conducted to assess the workability.

- This chapter presents, the details of the experimental investigation carried out to study the strength characteristics of concrete with the replacement of fine aggregate by copper slag. Thetest program includes the determination of strength properties by compressive strength and Water absorption tests.
- MIX PROPORTION
- Grade designation : M25
- Type of cement : OPC 43 grade
- Maximum nominal size of aggregate :12mm
- Maximum cement content :450kg/m³

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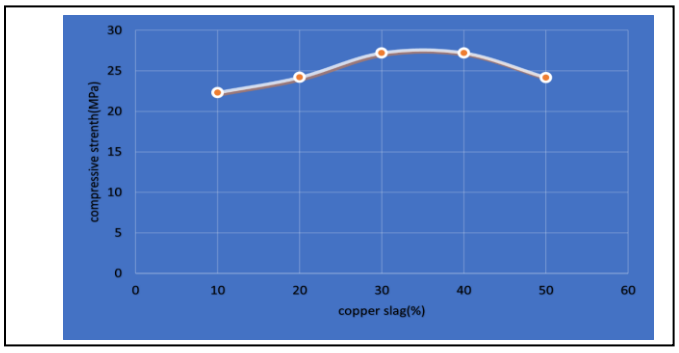
- Maximum water cement ratio:0.45
- Workability :25 mm Slump
- Exposure condition :Moderate
- Degree of supervision :Good
- Type of aggregate :Crushed
- Maximum cement content :450kg/m
- Quantity of Materials Required:
- For Size of Mould 200x120x65 mm Cement For 1 Mould= 0.9405 kg
- For 9 Mould = 0.9405x9 = 8.4645 kg Fine Aggregate = 09405x9 = 8.4645 kg
- Partial Replacement of fine aggregate by copper slag upto 10-50% of Fine aggregate:
- 10% = 10/100x8.4645 = 0.84645 kg
- 20% = 20/100x8.4645 = 1.6929 kg

  30% = 30/100x8.4645 = 2.53935 kg
- 40% = 40/100x8.4645 = 3.3858 kg
- 50% = 50/100x8.4645 = 4.23225 kg
- Coarse aggregate = 1.881x9 = 16.929 kg
- Water Cement Ratio=3.81lit

COMPRESSIVE STRENGTH

COPPER SLAG(%)	COMPRESSIVE STRENGTH		
	7DAYS	*14DAYS*	*28DAYS*
10	22.31	26.15	31.86
20	24.18	29.10	34.25
30	27.19	32.58	36.89
40	27.15	34.65	38.74
50	24.16	28.96	32.49



CONCLUSIONS

- When increase the copper slag content then density of concrete is decreased thus making concrete light weight in nature.
- The use of copper slag in paver brick decreases the unit weight of concrete.
- Water absorption is less by adding copper slag as fine aggregate as compare with normalbrick.
- Compressive strength increases with increasing the copper slag percentage from 10% to 40% replacement of copper slag and after 50% copper slag replacement onwards thestrength is decreases.

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