

Low Cost Building Material

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Abstract: *There is increase in population in very large amount due to this the disposal of solid waste is a major problem. The main objective of this study is to investigate the potential use of various solid wastes for producing construction materials. The paper is based on the innovative work in solid waste in which various raw materials are used such as fly ash, waste bricks, and waste glass to increase the strength of construction. This paper discusses the environmental implication caused by the generation of various solid wastes, and highlights their recycling potential and possible use for producing construction materials.*

Keywords: Solid waste, Recycling, Environment, Construction material

Introduction

Our world is facing severe problem of population. People are using various kinds of products which are produced from household industries, hospitals, public place etc from which solid waste is generated in large quantities, Due to which pollution is generated. To recover this problem of pollution and disposal of solid waste in proper manner invention is made of preparing construction materials from the solid waste.

The cost of construction material is increasing day by day because of high demand scarcity of raw materials and high price of energy from the standpoint of energy saving and conservation of natural resources the use of the alternative constituents in construction material is now a global concern for this the intensive research and development works towards exploring new ingredients are required for producing sustainable and environment-friendly construction materials. The present study investigates the potential use of various solid wastes in the production of construction materials. Besides, this study gives several examples on the use of solid waste based on construction materials in real construction

Major solid wastes and their potential use in construction materials

Growth of population, increasing urbanization and rising standards of living due to technological standards of living due to technological innovation have contributed to increase the quantity of a variety of solid wastes generated by industrial mining, domestic and source of solid waste are-

Fly ash and bottom ash: Generally the ash is generated from the thermal power plant for generate the electricity as well as it is a by-product from municipal solid waste. It is also obtained from coal combustion is frequently used in concrete as cost effective substitute for Portland cement. It improves the strength of concrete. Hence it can be used as one of the raw material for manufacturing of bricks, which are useful in construction materials. Fly ash can be replacement of clay effectively saves land and energy and decreases environmental pollution.

Phosphogypsum: Waste phosphogypsum is an industrial by-product of phosphates fertilizer production phosphate ore

or fluorapatite. Untreated phosphogypsum has the limited scope of utilization in construction materials due to the presence of undesirable impurities such as p2o5 fluorides organic matter and alkalis. However, phosphogypsum has been used as a set controller in the manufacture of Portland cement substituting natural gypsum, as a secondary binder with lime and cement in the production of artificial aggregates for soil and road stabilization.

Granulated blast furnace slag: Blast furnace slag is obtained during the manufacture of iron and steel and possesses inherent hydraulic properties. It can be utilized for making different types of construction material. Some of the construction material such as Portland slag cement and sulfated cement are produced.

Waste steel slag: Steel slag is a by-product produced during the conversion of iron ore or scrap iron to steel. Waste steel slag can be used to produce construction material such as cementations pastes and bricks. It reduces the firing temperature needed for brick production. However the compressive strength and firing shrinkage would drop in the presence of slag.



Figure: Waste Steel Slag

Waste Glass: A highly transparent material produced by melting mixture of silica, soda, ash and CaCO₃ at high temperature and then by cooling the melted mixture for solidification without crystallization is known as glass. Glass has proven its importance in our lives through manufactured product such as sheet glass bottles glassware and vacuum

tubing. It is not biodegradable and therefore creates a problem for solid waste disposal. The disposal into landfills also does not provide any environment- friendly solution. Hence, the use of waste glass in construction materials can be worthy solution to the environmental problem caused by this solid waste. A clean dry glass powder is useful as a substitute for Portland cement in concrete.



Fig :- Waste Glass



Fig:- Cube Test Of Waste Glass

Quarry Waste: Quarry waste is obtained as a by- product during the production of aggregates through the crushing process of rocks in rubble crusher unit. Using quarry waste as a substitute of sand in construction material would resolve the environmental problems caused by the large scale depletion of the natural source of river and mining sands in addition quarry waste can be a profitable alternative to the

natural sand when the overall construction cost increase due to the transportation of sands from their sources. Usually quarry waste is used in large scale as surface finishing materials in highway. Quarry waste has also good potential for producing normal and lightweight concretes.



Figure: Quarry Waste

Table 1: Major solid wastes and their use as a construction materials

S.No.	Name of waste	Type of waste	Use in construction materials
1.	Fly ash, bottom ash, organic fibers	Agro-industrial	Aggregates, concrete, supplementary cementing material, blended cement, bricks, tiles, blocks, particle boards, roof sheets, reinforced polymer composites
2.	Phosphogypsum, waste glass, granulated blast furnace slag, waste steel slag, rubber tire	Industrial	Fine and coarse aggregates, blended cement, concrete, bricks, tiles, ceramic product
3.	Quarry dust	Mining	Fine and coarse aggregates, concrete, bricks, tiles, surface finishing materials
3.	Concrete rubble, tiles, waste bricks	Industrial	Fine and coarse aggregates, concrete, bricks, blocks

Conclusion

During different industrial, mining, agricultural and domestic activities, huge quantity of solid waste are being generated as by-product which pose major environmental problems as well as occupy of a large area of lands for their storage and disposal, There is a tremendous scope for setting up secondary industries for recycling and using hug quantity of solid waste as minerals environment-friendly energy efficient and cost effective alternative material produce market potential to fulfill people needs in rural and urban areas, To effectively use the solid waste in producing alternatives construction materials.

<i>S. No.</i>	<i>Name of solid waste</i>	<i>Construction materials</i>
1	Fly ash	High performance concrete
2	Bottom ash	Aggregates
3	Ground granulated blast-furnace slag	High-performance concrete
4	Rice husk ash	Interlocking blocks
5	Quarry waste	Aggregates
6	Construction and demolition debris	Recycled concrete aggregate

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