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Green Concrete

Ashish Pandey[1], Ramendra Pandey[2] and Shweta Yadav[3]

[1,2]P.G. Student, Department of Civil Engineering, Madan Mohan Malaviya University of Technology, Gorakhpur, India
3Department of Civil Engineering, Madan Mohan Malaviya University of Technology, Gorakhpur, India
E-mail: [1]ashishpandey840@gmail.com, [2]imramendrapandey@gmail.com

Abstract—*Concrete is the most commonly used building material in the world. Pollution is becoming more and more serious with the increasing use of concrete in the world. It was observed that 0.9 tonnes of carbon dioxide is produced per tonne of cement production. By weight the cement composition is almost about 10% of the concrete. The reduction of emission of carbon dioxide in atmosphere is possible by using the green concrete towards the eco-friendly construction techniques. This paper gives an idea about the advantages and disadvantages about the green concrete. Some of the materials used in the manufacturing of green concrete are quarry rocks, crushed concrete marble sludge powder and fly ashes. It also helps in reducing the pollution in the atmosphere*

Keywords*: Green Concrete, Pollution, Recycled Materials, Eco-friendly construction, Geo-polymer concrete, Sustainable construction.*

1. INTRODUCTION

In 'Green Concrete' the word 'green' doesn't represent the colour of the concrete. Green concrete means that the concrete is eco-friendly. In other words, we can say that the concrete which is made from the concrete wastes which are eco-friendly are called as "Green Concrete". It represent that the concrete requires less energy in its production and produces less carbon dioxide than the normal concrete. The concrete should not be confused by its colour. Due to the use of recycled material the green concrete is considered to be very cheap to produce. At present green concrete is a miracle and tool for future when the natural resources are demolishing

Fig 1: Green Mix Concrete

1.1. Requirements of Green Concrete

To be called as "Green Concrete" the concrete should have the following requirement:

1. Requires the optimizes use of available materials.
2. It requires the better performance.
3. It enhanced cohesion workabiliry/consistency in the concrete.
4. It reduces shrinkage and creep in the concrete.
5. Their is no increase in cost.
6. It reduces the carbon foot print.
7. Certification of LEED.

2. MATERIALS FOR GREEN CONCRETE

1. Fly Ash
2. Marble Sludge Powder
3. Quarry Rock Dust
4. Recycled Aggregate
5. Blast Furnace Slag

2.1. Fly Ash

It has a number of advantages. It is used to improve the concrete performance in both fresh and hardened state. Fly ash helps in improving the workability of plastic concrete and strength and durability of hardened concrete. Fly ash is mainly available where there coal is being burned. Fly ash is less expensive as compared to the Portland Cement. We can make the best use of the fly ash by utilizing its cementitious properties.

Fig 2: Fly Ash

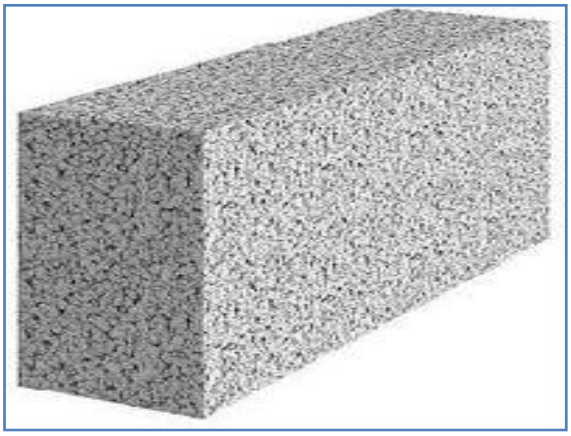

Fig 3: Fly Ash Block

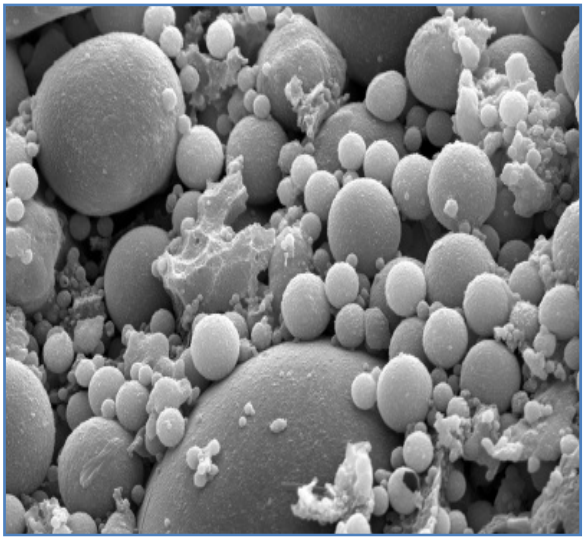

Fig 4: Source of Fly Ash

2.2. Marble Sludge Powder

Since ancient times Marble is commonly used as a building material. The disposal of the waste materials coming from the marble industry, which consist of very fine powders, is one of the major environmental problems in the worldwide now a days. We can improve the properties of fresh and hardened mortar and concrete by using these waste materials which are successful and economical.

Fig 5: Marble Sludge Waste

2.3. Quarry Rock Dust

It is made by blasting, crushing and screening coarse aggregate. Due to better interlocking it gain in strength and quarry rock dust has rough, sharp and angular particles. As compare to the conventional concrete quarry dust concrete experiences the better sulphate and acid resistance and its permeability is less.

Fig 6: Quarry Rock Dust

Fig 7: Dust Chemical Quarry

2.4. Recycled Aggregate

The aggregates which are obtained by crushing the concrete collected from the demolition site called as "Recycled Aggregate". These types of concretes are previously used in landfills by disposing at the site. It helps in reducing the mining of gravel for making concrete.

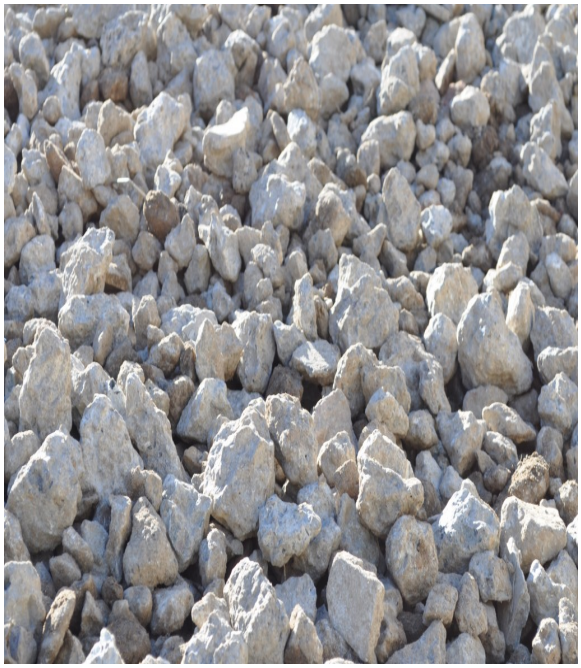

Fig 8: Recycled Aggregates

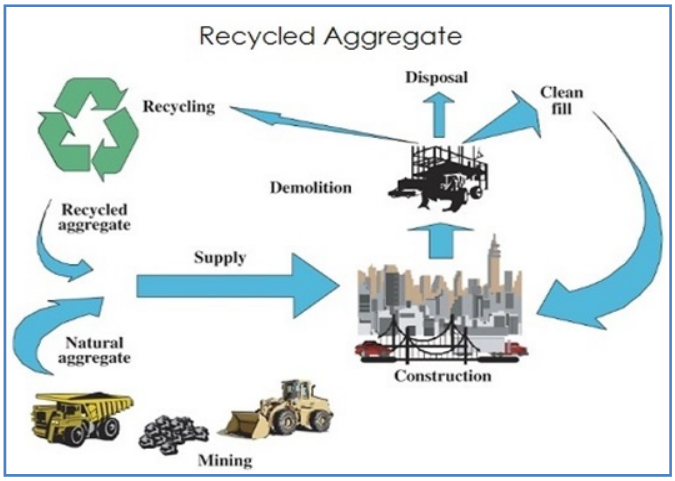

Fig 9: Recycled Aggregate

2.5. Blast Furnace Slag

It is another excellent cementitious material. In recent year the use of blast furnace slag in concrete is increasing considering and this trend is expected to continue.

Fig 10: Blast Furnace Slag

3. SUITABILITY OF GREEN CONCRETE IN STRUCTURES

1. It helps in reducing the dead weight of the structure.
2. It reduces the 30% of the emission of carbon dioxide from the concrete industry.
3. Concrete industry increases the 20% use of the waste products.
4. It requires less maintenance and repairs.
5. It helps in sustainable development and reduces the environmental pollution.
6. It helps in reducing the crane age load, allow handling and lifting flexibility with lighter weight.

4. APPLICATION OF GREEN CONCRETE

Following are the application of green concrete:

1. Widely used in the construction of building.
2. In constructing the columns.
3. In mass concrete projects.
4. Used in bridge construction.
5. In high density radiation shielding.

Fig 11: Application of Green Concrete

5. ADVANTAGES

1. It reduces the overall consumption of cement.
2. As compare to conventional concrete it is economical.
3. As compare to conventional concrete it has better compressive and split tensile strength.
4. It helps in reduction of creep and shrinkage.
5. It requires less maintenance and repairs.
6. It has good thermal and acid resistance.
7. Environmental pollution is reduced.
8. By the use of light weight aggregates we can reduce the self weight of the structure.
9. By the use of recycled aggregates it reduces the green mining.
10. As compare to the conventional concrete much change is not required in the preparation of green concrete.

6. DISADVANTAGES

1. Higher water absorption capacity.
2. In green concrete flexural strength is less.
3. As compare to the conventional concrete shrinkage and creep is high.

7. CONCLUSION

In this paper we concluded that there are various means to get the sustainable construction and one of the better means is by Green Concrete. Now a days, construction industry is using Green Concrete technology to get the sustainable construction without affecting the environment. Green concrete helps in decreasing the demand of natural resources. With the help of green concrete technology we can save the natural materials for the future generation.

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