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REITERATE AND REPLACEMENT OF CEMENT BY PLASTIC FOR COMPRESSIVE STRENGTH

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ABSTRACT

Plastic is very slow to be degraded in soil. So its necessary to manage the plastic waste properly. Plastic waste management is a big issue in front of local governing bodies e.g. Municipal corporations. Plastic waste is a major problem in big cities as day by day more and more plastic waste is getting generated and polluting our environment. Plastic bags which are commonly used for packing, carrying vegetables, meat etc creates a serious environmental problem. Plastic bag last in environment up to 1000 years because of plastic bag last so long the number of plastic bag accumulated increases each year. Hundreds of thousands of sea turtles, whales and other marine mammals die every year from eating discarded plastic bag for mistaken food. Our study focuses on using PET plastic in concrete as binding material instead of cement. PET is a major part in waste plastic, if we use PET as a construction material then it will save the energy required for manufacturing cement and CO2 emission due to production of cement will be eliminated. The plastic melting will produce harmful gases which are dangerous to human body, it may even cause cancer. Hence it requires special equipment to handle these gases and fumes. Scrubber system can be implemented to protect emission in direct atmosphere.

Keywords: cement replacement, PET, plastic.

I. INTRODUCTION

1.1 General:

Attempts have been made by various researchers to utilize this plastic waste in construction industry. Waste plastic has been successfully used as a partial replacement for binding material in road pavement.Use of plastic waste increases the overall performance of road pavement. The cement requirement insuch type of construction gets minimized and hence energy required for production of cement is also minimized. Presented data indicate that use of waste PET for modification of asphalt, cement and concretes improved their selected properties, which makes economical this approach. Furthermore, using of waste PET in building materials reduce usage of new polymeric materials, which has significant effect on environment pollution (e.g. emission of carbon dioxide, waste disposal problems, etc.)The aim of our study is to experimentally study the use of waste plastic as a binding material in concrete and bitumen. Previous research were done on use of waste plastic as the partial replacement of binding material in concrete and bitumen. Our aim is to study the plastic waste as 100%

replacement to cement and bitumen as a binding material. By experimental studies we will study the properties of matrix formed due to plastic waste as a binding material instead of cement.

1.2 Objective of the study:

The main purpose of this study is to check the suitability of plastic waste as the binding material in concrete. The replacement of cement has not been yet found, it may be the replacement if satisfactory results are found .

1.3 Scope of the project work:

If the results of experimental studies are found to be positive we will be able to manage our waste plastic and use it in concrete. If we get satisfactory results we can use a waste material which is harmful to the the environment as replacement of main ingredient of concrete. The main concern about this concrete is its compressive strength. If the compressive strength is found to be satisfactory then it can be used in main structural elements such as beams, columns and slabs. But while using it with steel reinforcement special measures needs to be taken as the bond between the steel reinforcement and plastic concrete may not be as ordinary concrete. It will require detailed analysis and research for using it in R.C.C structure. Even if the the compressive strength of plastic is found to be low then we can use it in P.C.C. or the plastic waste can be used in manufacturing of road pavement blocks, tiles or in ornamental structures. It needs to be regularly heated to be in molten form. Hence it requires special equipment's to be designed for placement of concrete in formwork. More safety measures needs to be taken at site while concreting because it may cause serious accidents as the temperature of concrete will be high while placing of concrete.

II. METHODOLOGY

2.1Materials

2.1.1Fine aggregates

- Those fractions from 4.75 mm to 150 micron are termed as fine aggregate.
- The river sand as fine aggregate conforming to the requirements of IS: 383 used.
- Natural sand is screened, to eliminate deleterious materials and over size particles

2.1.2 Coarse aggregate

- The fractions from 20 mm to 4.75 mm are used as coarse aggregate. The Coarse Aggregates from crushed Basalt rock, conforming to IS: 383 is being use.

Properties	Fine aggregate	Course aggregate
Bulk Density , kg/lit	1.53	1.42
Specific Gravity	2.71	2.64
Water Absorption (%)	0.4	0.3
Moisture content (%)	1.78	1.97

Table No .1Properties Coarse aggregate

2.2 Compressive testing machine test

- Test was carried out as per IS 14858: 2000.

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Figure.3 Compression testing machine

2.3 process for plastic.

- For the process of using plastic waste in concrete the following method should be adopted.

2.3.1..Separating/ segregating:

- in this process the plastic waste is first separated according to its type.
- The segregation must be done properly because different plastics have different properties so the need different processing.

FIGUR4: Separating of plastic

2.3.2Cleaning:

- any type of dirt impurities oil or grease must be removed so it will not hamper the further process or cause any danger to machinery.

2.3.3.Shredding:

- The plastic is then chopped in small pieces. For this purpose the shredding machines are available in market.

Figur5(a) Shredding

Figure 5 (b) Shredding

The shredded plastic waste is then stored and used in required quantity as per requirement.

FIGUR5(c) Shredded plastic granules

2.3.4 Melting of plastic by Pyrocycling :

- the melting temperature of plastic depends upon its type.

Material	Degrees(F)	Material	Degrees(F)
Acetal	400	Polyethylene (HD)	400
Polyethylene (LD)	325	Polypropylene	350
Acrylic	425	Polysulfone	700
ABS	400	PVC	350
Nylon	500	Polyamide-imide	650
Polyarylate	700	Polystyrene	700
PET	540	PPO	575

TABLE 3 melting temperature

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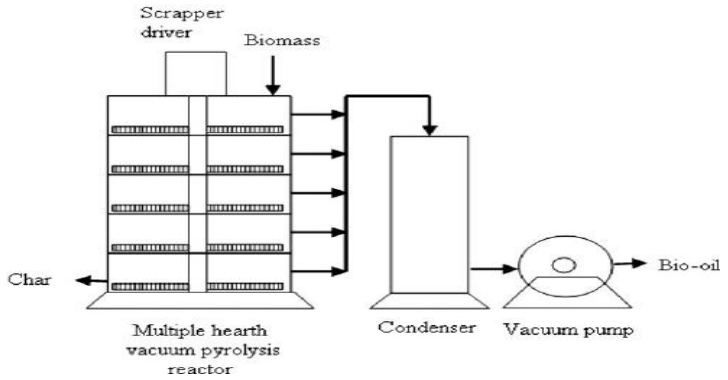
2.4 Pyrolysis

- Plastic is melted at lower temperature using pyrolysis process. This method is economical as melting is done by creating a vacuum. Plastic melts at lower temperature and this leads to lesser use of fuel.



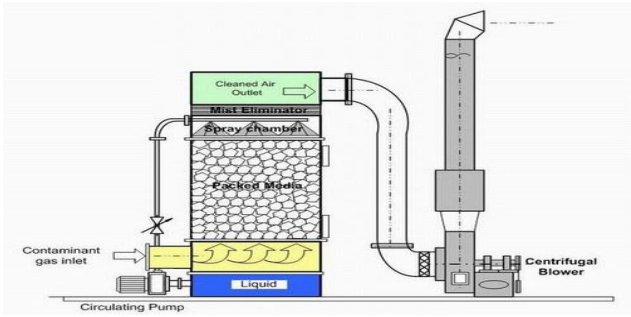
FIGUR(6) Pyrolysis melting process

- The Pyrolysis melting process creates an number of gases and fumes which are harmful to human body, As discussed earlier. So to stop direct emission of these gas we must use scrubber system.

2.5 Scrubber system:

FIGUR(7a) Venture fume scrubber system

- Are a diverse group of air pollution control devices that can be used to remove some particulates and/or gases from industrial exhaust streams.



FIGUR(7b) Fume scrubber system

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