



Valorization Of Waste Plastic In Concrete Mix (VWPCM)

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Abstract- when we look around us, we can see unused plastic that is accumulated through domestic and industries activities (e.g. Plastic bottles, bags and micro beads) Etc. This waste does not rot because it is non-bio degradable and therefore it remains in nature. In India public organization such as municipal corporations work to collect as well dispose of solid waste and dumped outside at open space far from city which causes air and soil pollution.

To overcome this problem we have suggested using the plastic waste in cement concrete. The ingredients generally used for preparing cement concrete are cement and inert material .the inert material that is fine and coarse aggregate can be replaced by waste plastic. Waste plastic is an inorganic in nature so it does not alter the chemical properties and also it does not affect the consistency and quality of cement concrete.

The waste plastic can be reduced to some extent from the environment as it's used in cement concretes this is a new contribution for future and field of concrete technology. The use of waste plastic in cement concrete replaced 10% to 15 % by weight of inert material will reduced the cost and may increase the quality of concrete .

Keywords: Cement Concrete, Waste Plastic, Aggregate, Cement.

I. INTRODUCTION

In India these days, 0.1 million tonnes' of solid waste is created each day which suggests that correct management of waste is one in every of the main issues we have a tendency to face these days to get rid of such waste. It's calculable that roughly 70% of plastic

packaging merchandise is born-again into plastic waste during a short span. Some styles of plastic don't decompose in the slightest degree, Plastic is employed in packaging, automotive and industrial applications, medical delivery systems, Artificial implants, different care applications, water chemical change, land/soil conservation, flood hindrance, Preservation and distribution of food, housing, communication materials, security systems, and different uses. With Such giant and ranging applications, plastics contribute to associate ever increasing volume within the solid waste stream.

Consistent with varied estimates, regarding 60% of plastic waste in Bharat is recycled and 40% of the waste is incinerated or drop within the soil. There's a great deal of effort globally to get rid of plastic waste. In fact, during this project we have a tendency to study the properties of plastic and emphasize however it is often employed in concrete.

Plastic could be a warp material that resists the stress and leads to failures in order that we have a tendency to be exploitation it as a filler material in concrete.

There are two main types of plastics –

I) Thermoplastics which are softened by heat and can be moulded (Injection moulded, blow moulded or vacuum formed). Good examples are acrylic, polypropylene, polystyrene, polythene and PVC.

II) Thermosets which are formed by ha heat process but are then set (like concrete) and cannot change shape by reheating. Good examples are melamine (kitchen worktops), Bakelite (black saucepan handles), polyester and epoxy resins.

We are considering concrete as an answer to plastic concrete could be a material within which if you acquire any ingredient, it'll mechanically enhance its properties the most feature that comes with it's the compressive strength that relying upon its mixing ratio. So we

consider it as M40 grade mix. In this M40 mixture, we will make various tests using a plastic that is suitable for the purpose.

The first thing we need to do when designing a mix for the M40 is come up with the standard (IS-10262: 2019 Concrete mix proportioning) and this standard are going to be helpful for measurement completely different materials to create this mix like the mensuration of sand, the mensuration of cement and also the mensuration of water, etc. By knowing what quantity sand is taken and what quite sand we'll use and its size, we'll apprehend through IS- 383 (specification for coarse and fine aggregates)

II. LITERATURE REFERENCES

1. Karthikeyan, et.al, They have studied that high strength concrete can be prepared of W/C ratio 0.35 and Waste plastic is replaced by 10% of cement, fine aggregates and coarse aggregates. The OPC cement (43 grade) with 29% give Norman consistency. Mix design is done for grade M20 as per IS 10260-2009 and they studied that Thermoplastic is used as filler by replacing some amount of cement, fine aggregates and coarse aggregates.

2. Miss Apurva, et.al, Used Plastic waste cut in pieces and passing through of size 2.36 and 4.75 mm IS sieve then the Aggregates mix is heated and plastic is effectively coated and then mixed with bitumen and the gravel having size between 4.75 mm to 38 mm were used they using 10 to 20mm size aggregates of fine-ness modulus <5.75 and Bitumen of grade 60/70 and 80/100 were used as well the Thermoplastic is used for coating the aggregates for that plastic firstly shredded in small pieces through Agglomerator.

3. S. Vanithal, et.al, In this paper waste plastic where incrementally added in 0%,2%, 4%, 6%, 8% and 10% to replace the sum amount of aggregate. The optimum modifier content of waste plastic is found to be 4% for paver blocks and 2% for solid blocks. If the additional plastic waste is added more than 4% then it will decrease this compressive strength.

4. Amiya Akram, et.al, In this paper the plastic waste like radio TV air conditioners mobile phones computers and several other electronic gadgets that have reached their end of life. By using hard plastic waste particles of coarse aggregate find effective way to reutilize. It is observed that the plastic alone was used it result in decrease in strength but when 10% fly ash was added results comparable to control specimen where obtained even for 15% proportion of e-waste.

5. Zainab Z. Ismail, et.al, They studied that 30 kg of waste plastic of fabriform shape can be used as a partial replacement for sand by 0% 10% 15% and 20% with 800 kg of concrete mixture. The compressive strength reduces for all waste plastic concrete mixture tends to decrease below the value for the reference concrete mixture. Decrease the adhesive strength between surface of waste plastic and cement paste and restrict the hydration of cement. With increase in the plastic waste ratio the flexural strength of concrete mix decreases.

III. MATERIALS:

1. OPC Cement: Argillaceous or silicates of alumina in the form of clays and shale's and Calcareous or calcium carbonate, in the form of limestone, chalk and marl which is a mixture of clay and calcium carbonate.

The ingredients are mixed within the proportion of regarding two elements of carbonate materials to at least one a part of clayey materials and so crushed and ground in ball mills during a dry state or mixed in wet state. The dry powder or the wet slurry is then burnt in a rotary kiln at a temperature between 1400 - 1500 °C. The clinker obtained from the kiln is first cooled and then passed on to ball mills where gypsum is

Table 1:- Chemical composition of OPC.



Fig- 1 Ordinary Portland cement.

2. Coarse Aggregates: Aggregates shall suits the necessities of IS 383, as so much as potential preference shall run to Natural aggregates. It is additionally used for base and sub-base courses for each versatile and rigid pavement.

Aggregates will either be natural or factory-made. The necessities of the aggregates in pavement are mentioned during this chapter. Aggregates form the main portion of the pavement structure. Bear stresses occurring on the roads and ought to resist wear thanks to abrasive action of traffic.

Aggregates are employed in versatile furthermore as in rigid pavements. Therefore, the properties of aggregates are of considerable importance to highway.

Oxide	Percentage (%)content
Calcium oxide (cao)	60-70
Silicon dioxide (sio2)	17-25
Aluminium oxide (Al2O3)	3-8
Ferric oxide (Fe2O3)	0.5-6
Magnesium oxide (mgo)	0.1-4
Alkalis	0.4-1.3



Fig- 2 coarse aggregates.



Fig- 4 waste plastic.

3. Fine Aggregates: The other form of aggregates is those particles entirely passing the 4.75 mm (No. 4) sieve, and preponderantly preserved on the 75 μ m (No. 200) sieve measure referred to as fine mixture. For increased workability and for economy as mirrored by use of less cement, the fine mixture ought to have a rounded form. The aim of the fine mixture is to fill the voids within the coarse mixture and to act as a workability agent



Fig- 3 fine aggregates.

4. Plastic: PET is used for high impact resistant container for packaging of soda, edible oils and Peanut butter (Table 1). Used for cereal box liners, Microwave food trays. Used in medicine for plastic Vessels and for Implantation. Plastic is heat resistant and chemically stable. PET is resistant to acid, base, some solvents, oils, fats. PET is difficult to melt and transparent.

Table 2:- Chemical properties of plastic.

IV. CONCLUSION

It is concluded that the thermoplastic waste cut in pieces and passing through of size 2.36 and 4.75 mm IS sieve then the retained plastic provide good performance while it is used to make concrete of high strength grade where The OPC cement (53 grade) with 29% Normal consistency with W/C ratio 0.35 and the Waste plastic is replaced by 10% by total weight of concrete ingredients where used they gives best result for Mix design for grade M40 as per IS (10262-2019).

V. REFERENCES

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Full Form	Polyethylene terephthalate
Molecular formula	$C_{10}H_8O_4$
Structure Composition	Polyester of Terephthalic acid and ethylene glycol.

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