

INNOVATIVE TECHNIQUES OF WASTE PLASTIC USED IN CONCRETE MIXTURE

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Abstract

Disposal of plastic waste in an environment is considered to be a big problem due to its very low biodegradability and presence in large quantities. In recent time use of such, Industrial wastes from polypropylene (PP) and polyethylene terephthalate (PET) were studied as alternative replacements of a part of the conventional aggregates of concrete. Plastic recycling was taking place on a significant scale in an India. As much as 60 % of both industrial and urban plastic waste is recycled which obtained from various sources. People in India have released plastic wastes on large scale have huge economic value, as a result of this, recycling of waste plastics plays a major role in providing employment.

Keywords: polypropylene (PP) and polyethylene terephthalate (PET) etc...

1. INTRODUCTION

Disposal of waste plastic consumer bags from the domestic has become a major problem to the agencies in the town and cities. The waste plastic bags available in the domestic waste mainly consist of low density polyethylene (LDPE). Plastic bags dumped in the dustbins find their way into the drainage system and clog them. Often, these are burnt along the roadside, which produces fumes causing air pollution.

Industrial wastes from polypropylene (PP) and polyethylene terephthalate (PET) were studied as alternative replacements of a part of the conventional aggregates of concrete. Five replacement levels.10 %, 20 %, 30 %, 40 % & 50 % by volume of aggregates were used for the preparation of the concretes.

1.1 Source of Employment in the Management of Waste Plastics

Plastic recycling was taking place on a significant scale in an India. As much as 60 % of both industrial and urban plastic waste is recycled which obtained from various sources. People in India have released plastic wastes on large scale have huge economic value, as a result of this, recycling of waste plastics plays a major role in providing employment. This helps for the economic development of the country. Indian construction industry creates lot of employment opportunities and accounts for major portion of the capital outlay in successive 5-year plans of our country.

1.2 Methodology

The main research of that project is to utilized recycled concrete as a coarse aggregate for the production of concrete. It is essential to know the replacement of Plastic

Aggregate (PA) in concrete is acceptable there are for the making of concrete used coarse aggregate having size 20mm, natural river sand used for making a concrete and plastic aggregate used in crushed concrete from the tested cubes. Test carried out on these aggregate specific gravity and Bulk density, and sieve analysis.

a mix design is produced in accordance with the properties obtained from test results. Concrete is then produced with replacement of 10%, 20%, 30%, 40% and 50% of plastic aggregate replacement of plastic aggregate with the same mix proportion.

2. EXPERIMENTAL PROGRAM

Total Forty-eight specimens and six beams & cylinders each for M20 grade of concrete with four different volume percentages of plastic (0%,10%, 20%, 30%,40%,50%) were cast as recommended by IS: 10262- 1982.

The main objective of this research is to determine specific gravity, water absorption, and abrasion value, crushing strength, impact test of two replacement levels, 0%, 10%, 20% and 30%, 40%, 50% by volume of aggregates were used for the preparation of the concretes.

- **Aggregates :** Coarse Aggregate (CA) Fine Aggregate (FA)
- **Coarse Aggregate (CA):** They should have following properties
- The Los Angeles Abrasion value shall not be more than 25 % (ASTM C131).
- The weighted average weight loss in magnesium sulphate soundness test shall not be more than 18% (AASHTO T 104).
- Flakiness index shall not be more than 25% (MS 30).

- The water absorption should not be more than 2% (MS30)
- The polished stone value should not be less than 40%.
- **Fine Aggregate (FA):**FA should have the following properties
- The angularity should not be less than 45% (ASTM C 1252).
- The absorption of water, should not be more than 2% (MS30)
- **Plastic Aggregate (PA):** This is made up from waste plastic and can be prepared by following steps
- Collection and Cleaning, Classification.
- Shredding and Cleaning.
- Heating and Melting.



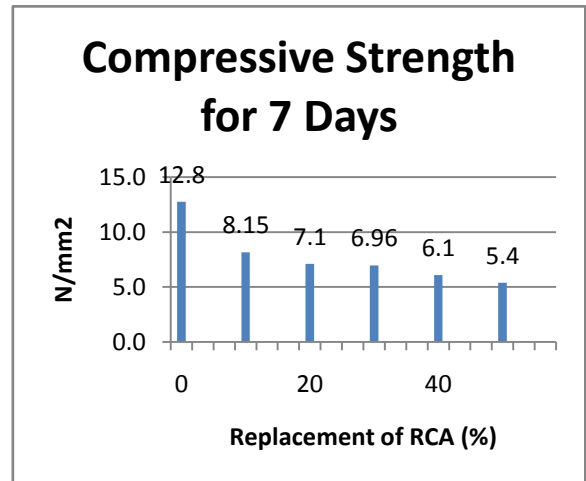
Physical Properties	CA	FA
Specific Gravity	2.85	2.433
Bulk Density	1600kg/cm ²	1700kg/cm ²
Fineness Modulus	4.65	2.2
Water Absorption	0.49%	0.22%
Free Moisture	NIL	2

Various Tests on Cement

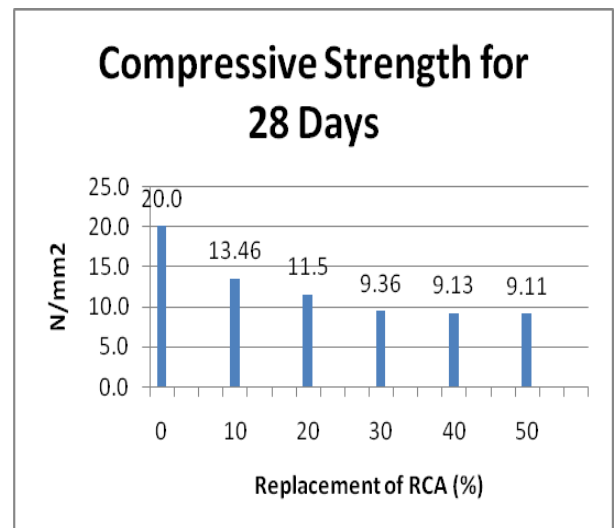
Test	Fine ness	Std. Consi stency	Initial setting Time	Final Settinn g Time	Sound ness	comp.S t. in N/mm ² 7 Days
Resu lt	1.18 8%	35	48 min.	285 min.	4.47 mm	24.02

Density of concrete

Replacement of RCA in %	0	10	20	30	40	50
Avg.Density of concreteSt.Kg /m ³	2758.5	2616.59	2436.10	2361.25	2215.4	2168.39



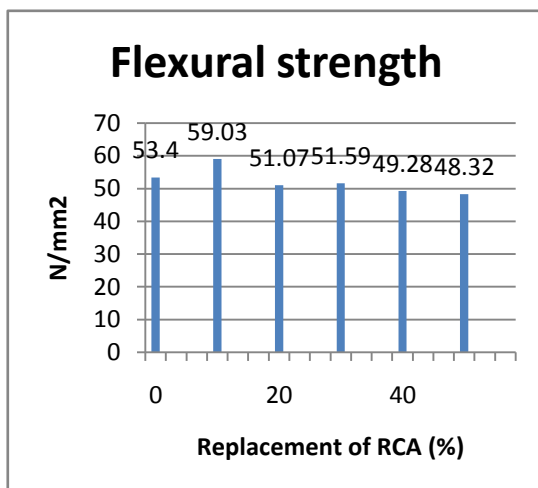
Compressive Strength test of Concrete for 7 Days



Compressive Strength test of Concrete for 28 Days



Replacement of RCA in %	0	10	0	30	40	50
Avg.F. St N/mm ² For 7 Days	40.4	41.2	37.9	38.3	36.4	35.8
Avg.F.St. N/mm ² For 28 Days	53.4	59.0	51.0	51.5	49.2	48.3



Flexural Strength test of Concrete for 7 and 28 Days

3. CONCLUSIONS

The test conducted on material like Cement, Sand, Conventional aggregate having all the results within permissible limit as per IS codes.

The modified concrete mix, with addition of plastic aggregate replacing conventional aggregate up to certain 20% gives strength within permissible limit.

Modified concrete casted using plastic aggregate as a partial replacement to coarse aggregate shows 10% it could be satisfied as per IS codes.

Density of concrete is reducing after 20% replacement of coarse aggregates in a concrete

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BIOGRAPHIES



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