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## Potential of polythene usage in concrete

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### ABSTRACT

*We as humans are living on the verge of declination because of the excess usage of plastics in our daily life. The construction world keeps on working in innovate ways in order to reduce the workload of the construction units. Plastics, a very important material that was being invented but this has to lead us to many problems like disposal, recycling, etc. the safe treatment of such thing or material is a great challenge to humans and its safe disposal is very challenging. Since this plastic led to a different type of pollution and these problems can be reduced by the usage of plastics in construction. Plastics have the potential to improve the properties of concrete like compressive strength, tensile strength, etc.*

**Keywords**— Concrete, Tensile strength, Compressive strength, Pollution

### 1. INTRODUCTION

The plastics have created immense comfort to the humans but ultimately this comfort has led to immense problems. The generation rate of plastics is too high. Millions of tons of plastic garbage have been thrown in land, sea, ocean etc threaten the environment as well as the humans. Millions of animals get exposed to such materials which they consume unknowingly and ultimately they die.

There has been a constant effort on the research line in order to get rid of or to innovate the technique of disposal hence the construction unit research filed is no way lagging behind it.

The usage of different materials like husk ash, coconut choir, glass powder, marble dust etc has shown great results in the improvement of the properties of the concrete. On addition of plastics in concrete inappropriate rate and amount has the potential to improve the quality of concrete.

### 2. OBJECTIVE AND AIM OF RESEARCH

The main aim of the research is to find out the potential of waste plastic materials in the field of concrete technology. Plastics are being used everywhere whether it is the packaging of food, toys, carry bags, water bottles etc. they are everywhere around us.

Here we are trying to find out the improvements in the concrete with the addition of waste plastics by performing different tests. Here author wants to suggest that the plastic disposal can be solved with the improvement of properties of concrete

### 3. MATERIALS AND METHODOLOGY

For the different test, we require some basic materials like:-

- The cement of OPC grade 53
- Aggregates both coarse and fine
- Water
- Plastics (waste plastic materials)

#### 3.1 Cement

Cement is a very important and basic ingredient of the construction unit. Following are the test analysis which was obtained during a different test of cement.

**Table 1: Properties of cement**

Physical properties	Results obtained
Consistency	25.3%
Initial setting time	38 minutes
Final setting time	220 minutes

#### 3.2 (a) Fine aggregate

**Table 2: Properties of fine aggregate**

Physical properties	Results obtained
Specific gravity	2.37
Finess modulus	2.5
Water absorption	0.76%

#### (b) Coarse aggregate

**Table 3: Properties of coarse aggregate**

Physical quantity	Results
Specific gravity	2.8
Finess modulus	2.4
Water absorption	0.35%

#### 3.4 Water

Water is taken from the tap or normal water according to the ISCODE 456-2000.

### 3.5 Waste plastics or polythene

Waste plastic is collected from streets, dust bins etc.



Fig. 1: Picture of polythene collected

## 4. METHODOLOGY

In order to analyze the results we have to perform the certain test and hence few of the test are:

(a) **Compressive test:** for compressive tests we have to cast concrete cubes of size 100mmx100mmx100mm.

(b) **Tensile strength test:** we have to prepare cylindrical specimens of 150mm diameter and 300 mm length.

The concrete mix was prepared according to M30 grade of concrete having water-cement ratio 0.5.

### 4.1 Compressive strength performance

For performing the compressive strength we have prepared cubes of dimensions 100x100x100mm for 7 days, 14days and 28 days using control mix or normal mix concrete.

Whereas the concrete is mixed with a various portion of plastics in it as 2%, 3.5%, and 5% and hence cubes are prepared with this mixture as well.

Table 4: Compressive strength of control concrete mix cubes (N/mm<sup>2</sup>)

7 days	13.39
14 days	22.47
28 days	28.61

Whereas when we mix different proportion of plastic in concrete we observe certain fluctuation in the compressive strength of cubes.

Table 5: Compressive strength of plastic concrete mix cubes (N/mm<sup>2</sup>)

0%	2%	3.5%	5%
13.39	14.12	15.10	13.74
22.47	24.73	21.36	19.56
28.61	26.45	25.54	23.39

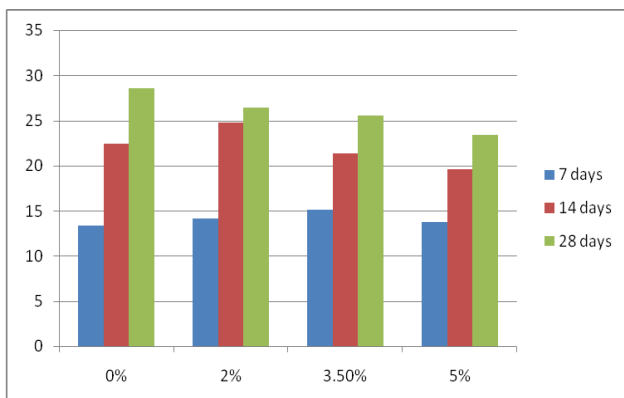


Fig. 2: Comparison of strength

### 4.2 Split tensile strength

The split tensile strength test is very important because with this test we will be able to observe the effect of plastic in tension produced.

Concrete is very ideal in compressive zones and results have shown they are good in compression region but the major drawback is towards the tensile region, so in order to check whether they are able to sustain the effect we have to perform this experiment.

For this experiment, we have to use a cylindrical specimen of 150mm diameter and 300mm length.

Table 6: Split tensile test observation of control mix specimens (N/mm<sup>2</sup>)

7days	1.36
14 days	1.78
28 days	3.43

Table 7: Split tensile observation for plastic concrete mix specimen (N/mm<sup>2</sup>)

7days	1.54	1.73	2.21
14days	1.86	2.11	3.19
28days	3.73	4.24	3.65

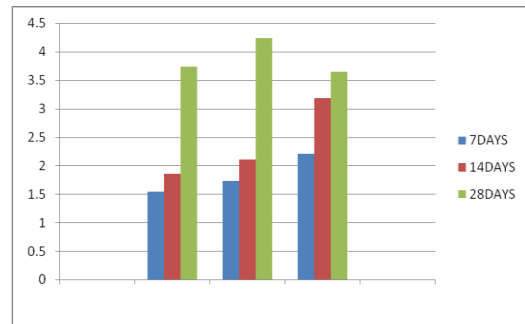


Fig. 3: Comparison of tensile test results.

## 5. RESULTS ANALYSIS

Since the experiment performed shows us various fluctuations in results, in the compressive test we observe that the strength obtained by the control mix was 13.39 in 7 days, 22.7 in 14 days and 33.65 in 28 days.

On addition of different % of plastic in concrete mix, we observe there is a fluctuation in the strength. Like on 7 days the strength gained was 14.12, 15.1, and 13.2 in 7 14 and 28 days of 2% mix.

Hence we can say that in the addition of 5% plastic content the strength reduces but on 2% and 3.5% it is commendable. Same with the tensile strength results we have a comparison result there was an improvement in the tensile results.

## 6. CONCLUSION

On observation and analysis of all the results and data obtained we finally came to the following conclusion:-

- The compressive strength of concrete shows increment in the strength of the addition of plastic content up to 2, 3.5%.
- The split tensile strength also shows increment on the addition of plastic waste.
- There is hope or chance that a load of recycling can be reduced by the application of waste plastics materials in concrete or construction unit.

- (d) It could be any initiative towards the awareness and keeping the environment free from dangerous hazards of plastics.

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