

**REUSE OF HOSPITAL PLASTIC WASTE IN CONCRETE AS A  
PARTIAL REPLACEMENT OF COARSE AGGREGATE: A  
RESEARCH PAPER**

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**Abstract**

Concrete is a most common material for human being to use in construction. In this study, the behavior of the hospital plastic as aggregate in concrete has been investigated on compressive strength weight reduction and workability. Also the impact resistance of concrete contains plastic aggregate has been carried out deeply in this study. Hospital plastic waste one of the unwanted plastic category, is recycled now this training. Reason to choose the hospital plastic waste to develop a new process toward removal it to valued creation and to explain the problematic of removal the loads of plastic unused. The natural a series of four concrete mixes were prepared with replacement ratio of plastic aggregate 0%, 10%, 15% and 20% by volume of natural aggregate. Also the same ratio used by adding plastic waste without replacing aggregate in the impact resistance test. The workability of the new material was originate to fall by growing plastic satisfied. From the results obtained it remained revealed that the compressive strength of the material also decrease appreciably through rise now the plastic satisfied. The workability of the fresh concrete both for the control and concrete with plastic aggregate were determine using the slump cone test.

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**Keywords:**

Compressive strength;  
Plastic aggregate;  
Flexural strength;  
Casting;  
Durability.

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## 1. Introduction

Concrete is a maximum broadly used creation material in the biosphere. There is a concern to more understanding and to improve its properties. Using waste and reprocessed materials in concrete mixes becoming progressively important to manage and treat both the solid waste produced by industry and municipal waste.

Plastic stands unique of the greatest important improvements of 20th era material. The quantity of soft expended annually has been growing steadily and becomes a serious environmental problem. Aimed at explaining the removal of big quantity of reused soft substantial, use of plastic now concrete production is careful by way of possible submission.

Concrete capacity contains from 65–80% aggregate and it plays a large part in material effects such by means of workability, asset, dimensional constancy, plus stability, so the use of unwanted resources in concrete by means of collections can effect in the amount of waste materials deeply. Unimportant collection remains an essential substantial now decreasing the part load of material. An effort consumes already remained complete scheduled the usage of soft unwanted as plastic aggregate such as Lightweight aggregate.

An analysis happening the usage of plastic waste now homework of adhesive filling then material research is now open, bodily and automatic things for the application of material modified with plastic were calculated

Records about using plastic as aggregate were provided only for some of properties, some main things such for example impact resistance, durability, disappointment features, thermo-physical things, toughness presentation of paste filling and concrete covering plastic as collection need more study.

This study aims at examining the effect of recycled plastic in concrete as course 2 aggregates in the impact resistance, through a better considerate the behavior of Recycled plastic in concrete structures, experimenting fresh and hardened concrete Mixture containing recycled plastic

## 2. Methodology

The core study of that mission remains near developed reused material by means of a rough collection designed for the manufacture of material. It be there necessary near recognize the replacement of Plastic Aggregate in concrete stands suitable here are intended for the making of concrete recycled coarse aggregate taking dimension 20mm, normal waterway sand recycled for production a material also soft collection used in wrinkled concrete since the confirmed cubes. Investigation carried out happening these collection specific gravity plus Bulk density, plus sieve analysis.

A mix design stands created in agreement with the things achieved after investigation results. Concrete remains before made with replacement of 10%, 15% and 20% of plastic aggregate standby of plastic aggregate with the similar combination ratio.

## 3. Experimental Program

Overall Twenty-four samples designed for M20 grade of concrete through four dissimilar size measurements of plastic (0%, 10%, 15%, 20 %,) stayed company as mentioned in IS: 456-2000 The core purpose of this investigation stands to define specific gravity, water absorption, plus abrasion value, crushing strength, impact experiment of three replacement levels, 0%, 10%, 15% plus 20% in size of aggregates remained recycled designed for the research of the concretes. Water cement ratio is 0.5 in this study.

Materials used:

- [I] Natural coarse aggregate (16mm-20mm)
- [ii] Natural fine aggregate (sand)
- [iii] Plastic Aggregate (16mm-20mm)
- [iv] Cement OPC 43 grade
- [v] Water, Curing Tanks
- [vi] Hand mixing tools, vibrator
- [vii] Cube

## 4. Result

### 4.1 Slump (Workability)

Table Effect of Plastic Aggregate on Slump Test Results

Mix #	% Plastic aggregate	Slump (mm)	w/c Ratio
Plastic aggregate (0)	0	120	0.5
Plastic aggregate (10)	10	100	0.5
Plastic aggregate (15)	15	90	0.5
Plastic aggregate (20)	20	110	0.5

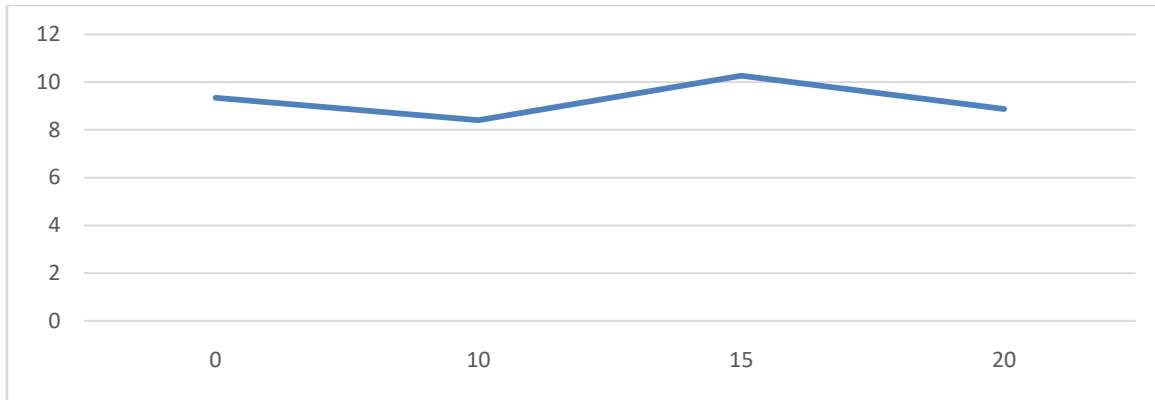
### 4.2 Compressive Strength Test

The compressive strength aimed at w/c proportion of plastic additional concrete plus control concrete remained verified at the finish of 28 days.

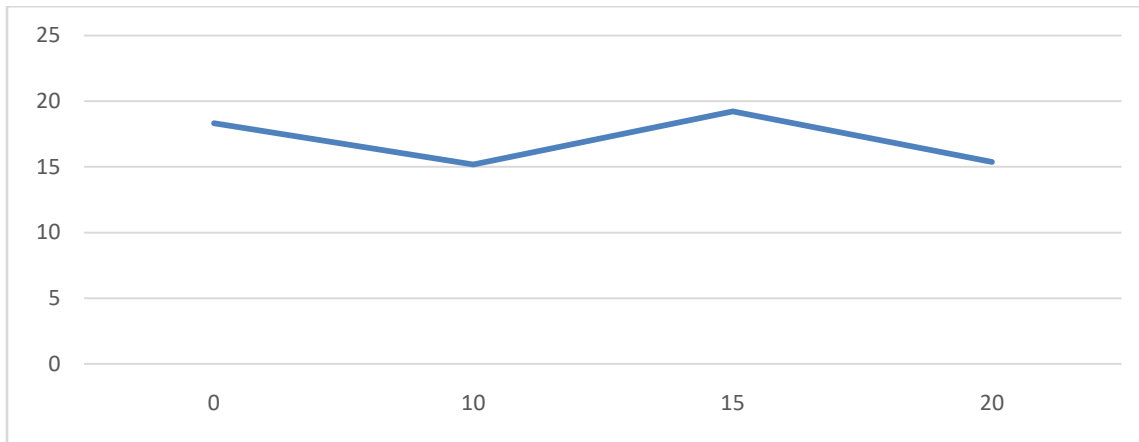
The water cement proportion remained occupied as 0.5. Three cubes of every water cement proportion stay casted plus the normal of three experiment results remains occupied for exactness of the effects. The concrete cubes remained treated on room temperature. The importance of compressive strength achieved are tabulated in Table

Table Compressive strength results for Normal and Plastic concrete

DAYS	Normal (N/mm <sup>2</sup> )	10% Plastic (N/mm <sup>2</sup> )	15% Plastic (N/mm <sup>2</sup> )	20% Plastic (N/mm <sup>2</sup> )
7	9.34	9.11	7.04	9.41
28	18.30	16.30	13.26	15.26



7 Days of Compressive strength of Normal & Plastic Concrete



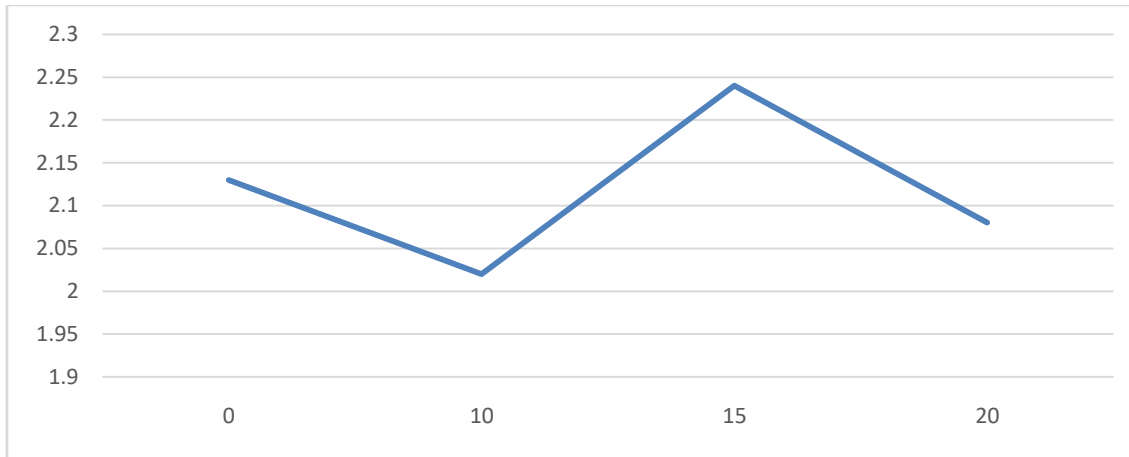
28 Days of Compressive strength of Normal & Plastic Concrete

### 4.3 Flexural strength Test

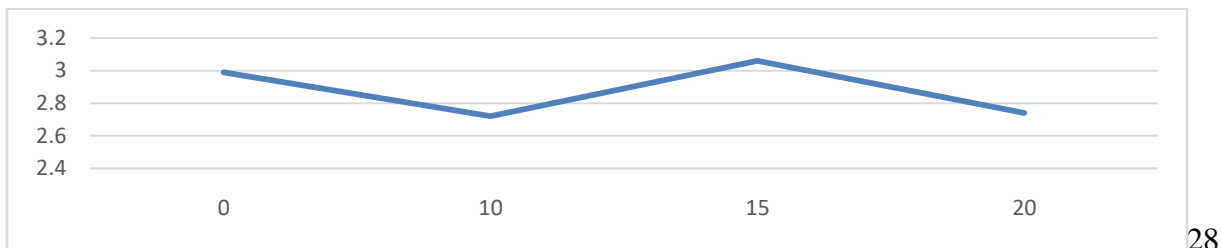
Formula= $0.7\sqrt{f_{ck}}$  according to [IS: 456-2000]

Table Flexural strength of Normal and Plastic Concrete

Days	Normal (N/mm <sup>2</sup> )	10% Plastic (N/mm <sup>2</sup> )	15% Plastic (N/mm <sup>2</sup> )	20% Plastic (N/mm <sup>2</sup> )
7	2.13	2.02	2.24	2.08
28	2.99	2.72	3.06	2.74



7 Days of Flexural strength of Normal &amp; Plastic Concrete



Days of Flexural strength of Normal &amp; Plastic Concrete

Table Unit Weight of Normal and Plastic Concrete

Sr. NO.	Types of concrete	Unit Weight (Kg)	% Reduction
1	Normal	8.531	0
2	Plastic (10)	8.186	0.04
3	Plastic (15)	7.857	0.07
4	Plastic (20)	7.368	0.14

## 5. Conclusion

There was decrease in the workability of the concrete with rise in the part of waste plastic contented now the concrete.

The compressive power of completely the concrete example increase with growing curing days. The compressive strength similarly decrease with increase now plastic contented now the concrete. The compressive power designed for the normal concrete is greater than the compressive power of concrete sample covering plastic.

Plastic aggregate container stand used as a incomplete replacement of normal aggregate by a percentage can be reached 20%. Increasing plastic aggregate from 10% to 15% and already to 20% leads to a decrease in the slump value and the filling ability of the concrete mix.

The usage of the plastic in the material reduced the total material bulk density after related to conventional concrete which lead to produce light-weight concrete. Plastic can be used to exchange particular of the aggregate in a concrete combination. This gives to falling the unit weight of the material. This is valuable in presentation needful nonbearing light weight concrete such as concrete boards used in cover-ups.

More types and size of plastic aggregate need to be taken into consideration. The result of dissimilar W/C proportion on the automatic things of concrete with plastic aggregate essential to more study. Other studies are stimulated to get the result of using dissimilar percentage of plastic in nonstructural component. The impact of the adding of fantastic plasticizers on the spontaneous things of concrete mixes cover plastic need to be reserved into attention. The strength presentation of concrete covering plastic aggregate requirements to be other studies.

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[8] Indian Standard Specification IS: 456-2000.