

EFFECT OF BAKELITE PLASTIC ADMIXTURE AS A COARSE AGGREGATE IN A CONCRETE: A RESEARCH

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Abstract– This project mainly deals with the provision of the different types of plastic wastes for the partial replacement of coarse aggregate in a particularly specified amount. It is the measure of the compressive strength which results to the reduction in the cost of preparation of concrete mix. This concrete mix generally emphasise the increase in the compressive strength of the concrete. This concrete mix is mainly used for the preparation of footing that means for the maximum load bearing of the any structure. The compressive strength of this concrete mix enhances because it is prepared with the use of bakelite. It is used in this concrete mix because it has very complex molecular structure which makes very hard to its deteriorating feature. This complex molecular structure is very difficult to breakdown into different smaller compounds. Therefore, the chances to deterioration due to the weathering attacks. These individual components enhance the property of whole concrete mix altogether.

Key Words: Plastic Admixture, PVC Pipe, OPC, Silicamate, DIDP, Super Plasticizers, Bakelite.

1. INTRODUCTION

In the modern era of construction, the main focus of every civil engineering expert is to lower the cost of construction without altering its characteristic strength, durability and all the chemical property of that concrete mix. The concern on the reduction of the cost of construction tends us towards the increase in the use of

waste materials which are readily available within a very nominal cost.

In the preparation of concrete mix with higher grade, the best alternatives of the different component of concrete mix are investigated by the preceding's of different tests for the concrete mixes. In the findings of best alternatives, the project is basically concluded with the use of the wastes which contains polymer components in it, because the polymer shows the complex molecular structure which is very difficult to breakdown into different smaller components. In this concrete mix only, the partial replacements are done for the enhancement of the concrete mix.

This project basically deals with the replacement of coarse aggregate in a particularly specified ratio, in which 5%, 10%, 15% & 20% are adopted for the partial replacements of the coarse aggregates. In this study other ratios are remained same for the different concreting materials, it is also a good condition for this concrete mix that no other replacements are done, which benefits the concrete mix by maintaining the specific gravity of the different components which are basically used in the preparation of the better concrete mix.

2. LITERATURE REVIEW

This project is based on the earlier studies performed on the different aesthetics and approximately similar chemical and physical properties. Many of the researches

are performed for maintaining the physical and chemical properties of the concrete.

Chien-chung chen, concluded the fact that the use of plastic is not suitable when it is used in higher proportions because the use of its higher proportions differs the characteristics strength of the concrete mix upto higher extent, also a large difference is seen in its strength. He also concluded the fact that only plastic use in the concrete is not suitable for increasing any of its properties.

Raghatate Atul M. emerges some basic knowledge by providing few keynotes that the use of plastic will help to increase the tensile strength of the concrete and also it helps to reduce the plastic waste from the environment and make the concrete mix eco-friendly because it is very hard to destroy the chemical bonding of the plastic polymerism.

S. K. Duggalhas given the fact that the use of waste plastic will decreases the characteristics strength of the concrete mix and also due to the improper bonding of the whole compound the flexural strength of the concrete structures also decreases. The minimum slump value is obtained with the increase in the percentage of plastic wastes which results in the poor workability of the concrete mix. This lower value of slump is overcome with the use of superplasticizers, which results in the increase in the workability of the whole concrete mix. The lower flexural strength results in the minimum resistance to the applied bending moment on the structures.

Thus, concluding all the facts from different studies, the keypoints are arise in the project that the use of plastic wastes is with some complex polymer compounds which results in the good workability and characteristics and flexural strength.

3.METHODOLOGY

The methodology of the Bakelite plastic concrete is that since Bakelite is the thermosetting plastic which means whenever the temperature is increase then the Bakelite plastic is become hard and maintained the strength of the concrete. In this research we replace the Bakelite plastic waste as a coarse aggregate with the partial replacement with 5%,10%,15% and 20%. After the replacement we prepare the M20 grade of the concrete and check the compressive strength and tensile strength of the concrete.



Fig -1: Casting of cylindrical vassal & Cube.

4. MATERIAL PROPERTIES

4.1Cement

Table-1: Properties of Cement.

Properties	Test Results
Initial setting time	43min
Final setting time	242 min
Specific gravity	3.2
Standard consistency	29%
Compressive strength after 3 days in N/mm ²	31
Compressive strength after 7 days in N/mm ²	36
Compressive strength after 28 days in N/mm ²	48.2

4.2 Fine Aggregate

Table-2: Properties of Fine Aggregate.

Properties	Test Result
Finess modulus	2.8
Specific gravity	2.60
Water absorption	0.59%
Moister content	0.15%

4.3 Coarse Aggregate

Table-3: Properties of Coarse Aggregate.

Properties	Test Result
Finess modulus	3
Specific gravity	2.6
Water absorption	0.55%
Moister content	0.1%
Aggregate Impact value	8.15%
AggregateCrushing value	21.08%

4.4 Water

According to IS 456 2000 the water is to be used which is free from impurities for casting and curing of the concrete.

4.5 Bakelite plastic

The Bakelite plastic is the thermosetting plastic which is the property it cannot be reshape after moulding or shape. Whenever the temperature is rise then it became hard.

4.6 Concrete Mix

Preparation of the concrete with the help of the waste Bakelite plastic admixture with the partial replacement of aggregate 5%,10%,15% and 20% and check the

compressive strength and tensile strength through the UTM and CTM machine.

5.COMPRESSIVE STRENGTH TEST

Test was carried out as per IS 14858:2000. The compressive strength of the concrete is carried out through the 15×15×15m³ three cube is to be prepared for each proportion i.e. 5%,10%,15% and 20%.

Table-4: Compressive strength value

% of plastic mix in concrete	7days in N/mm ²	14days in N/mm ²	28 days in N/mm ²
0%	16	21	25.4
5%	14.5	19.32	24
10%	12.8	18	23.3
15%	12	17.5	22.23
20%	11.6	15.9	21

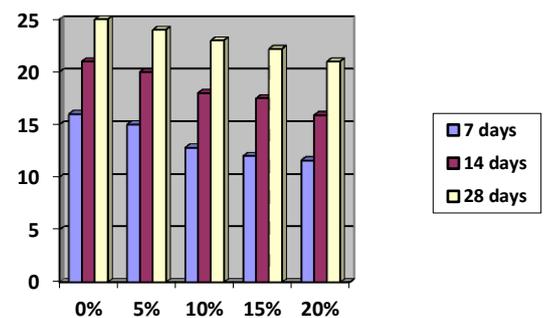


Chart-1: Compressive strength value

6. TENSILE STRENGTH TEST

The result of the tensile strength test is given below:

Table-5: Tensile strength value

% of plastic mix in concrete	7days in N/mm ²	14days in N/mm ²	20days in N/mm ²
0%	1.6	1.9	3.5
5%	1.7	2	4
10%	2.4	2.65	4.9
15%	2.85	3.9	5.5
20%	3.2	5.4	6



Fig -2: Cube Before fracture



Fig -3: Cube After fracture

The different readings revolve the fact that the absolute maximum value is obtained at 28 days for the specified ratio of 20% of the bakelite plastic admixture. There characteristics influence in the concrete mix is seen in the above table.

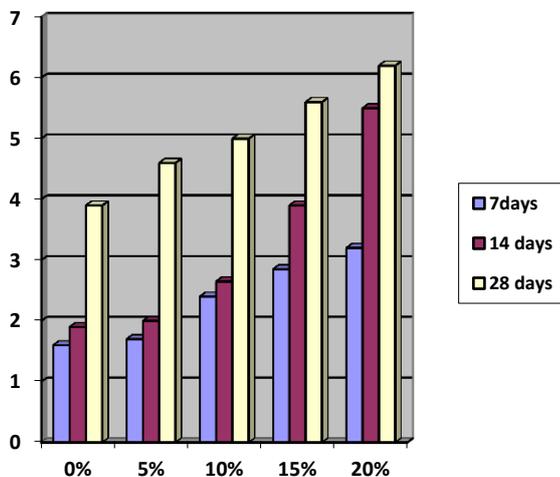


Chart-2: Tensile strength value

7. ADVANTAGE OF BAKELITE PLASTIC CONCRETE

- Reduce steel reinforcement requirement.
- Improve Ductility.
- Lower the water penetration and improve the impact resistance.
- Increase resistance to plastic shrinkage during curing.
- Reduce crack width and control the crack widths tightly, thus improve durability.

8. DISADVANTAGE OF BAKELITE PLASTIC CONCRETE

- Its only disadvantage is that it is very costly.

9. CONCLUSIONS

After discussing all the above point, we come to conclusion that if we partial replace the coarse aggregate with the Bakelite plastic then we find that, the compressive strength is decrease with increase the percentage of waste Bakelite plastic mix while the tensile strength is increase with increase the percentage of waste Bakelite plastic mix concrete. The most beneficial thing for this concrete mix is, when the compressive tests are done at the 28 days then there characteristics strength reached above the targeted strength which satisfies the use of bakelite in the concrete mix.

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