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International Journal for Modern Trends in Science and Technology, 7(03): 57-61, 2021

ISSN: 2455-3778 online
DOI: https://doi.org/10.46501/IJMTST0703010
Available online at: http://www.ijmtst.com/vol7issue03.html

An Experimental Investigation on High Strength Binary Blended Polymer Hybrid Concrete using polycarboxylate Super Plasticizer

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To Cite this Article
Ragini Matharaboena and Dr.R.Dinesh kumar, "An Experimental Investigation on High Strength Binary Blended Polymer Hybrid Concrete using polycarboxylate Super Plasticizer", *International Journal for Modern Trends in Science and Technology*, Vol. 07, Issue 03, March 2021, pp.: 57-61.

Article Info
Received on 27-January-2021, Revised on 28-February-2021, Accepted on 02-March-2021, Published on 07-March-2021.

ABSTRACT

Concrete the arena's most consumed material after water on the earth planet. Concrete is the cloth that's stated to be sturdy in compression and susceptible within the tension. Steel is the ductile fabric to resist anxiety in the concrete. Cement is the non-acidic and alkaline which save you the metal from corrosion. The most important attention on this experimental take a look at inside the beyond is made to make concrete strong in tension with less use of metal and with using a few replacements. The Steel crimped fibres are said for use to enhance the homes of concrete that have the improvement to the age factor of concrete. The use of Polypropylene fibres to enhance the flexural assets inside the concrete. Past Experimental research with the aid of part of the past researchers. The use of polycarboxylate amazing plasticizers to enhancethe workability and to lessen the water percentage material with in the concrete along with improve the compressive electricity with the emphases at the specific properties of concrete to triumph over the special botheration in concrete. Concrete has been serious trouble manifest in now every day so we want to find out the arrangement of this difficulty. In this undertaking to be middle around attributes best of solid evaluation of cement with various corresponding of supplanting of concrete with and we along with pleated metallic fibre. To utilising metal fibre, improve the flexural pleasant of cement in diverse range mixture. The solid of blend to be casted with metallic fibre and without metal fibre in vary costs 0.8% 1.8% 2.8% and 3.8%. To trust the cost of improvement to be examines. The 3-d squares and chamber have been tried for both split malleable (150 mm width and 300 mm period chambers) and compressive excellent 3-D shape. At final, the high-quality presentation of blended fibre concrete is contrasted and the exhibition of commonplace cement

KEYWORDS:*Hybrid Fiber, Polypropylene Fiber, Steel Fiber Concrete, Polycarboxylate.*

INTRODUCTION

Concreteisthe material which is mostly used product in construction. It is flexible, has best engg. residences, may be taken into any shapes and with charge powerful materials. There is an antique saying that damaged stone, sand, and cement make correct concrete. But the identical share of broken stone, sand and cement also make terrible concrete.To make appropriate concrete now kind of modern substances along with fibers, Admixtures and production chemical compounds, pozzolanas and specific concrete making techniques are adopted in current construction.Adding of fibers will control the cracking due to Shrinkage and reduce the level of bleeding in concrete. Addition of steel fibers in

concrete also shows higher Compressive electricity, flexural strength and to improve the strain capacity of concretethan nominal concrete.In recent years, in depth research has ended in advances and Innovation in the era of fibers consisting of glass, polypropylene, carbon etc., and extra simple understanding has been won at the behavior of cement concrete containing those fibers. Concrete is a good material & which contains cement, water, aggregate, and aggregates &discontinuous discrete fibers. Incorporation of quick discrete fibers (steel, polypropylene, glass, carbon) can lead to useful enhancements inside the mechanical behavior of tension weak concrete.

LITERATURE WORK

[1] KolliRamujee (2013) the enthusiasm for the utilization of filaments for the Strength has expanded during the most recent quite a long while. A mix of high quality, solidness and warm obstruction well describes the strands. In this exam, the aftereffects of the Strength Properties of Polypropylene fibre fortified cement were introduced. The compressive quality, parting rigidity of solid examples made with various filaments sums fluctuates from 0%, 0.5%,1% 1.5% and 2.0% were considered. The examples included Polypropylene strands of 1.5 % demonstrated better outcomes in correlation with the others.

[2] Milind V. Mohod (2015) In this investigation manages the impacts of the expansion of different extents of polypropylene filaments on the properties of High-quality cement (M30and M40 blends). A test program was done to investigate its impacts on compressive, elastic, flexural quality under various relieving condition. The primary point of the examination program is to consider the impact of Polypropylene fibre blend by fluctuating substance, for example, 0%,0.5%,1%,1.5% and 2% and finding the ideal Polypropylene fibre content. A remarkable increment in the compressive, tractable and flexural quality was watched.

[3] Khajuria and Balaguru, (1989) certain occasions, water is more than require added to fibre cement to improve its usefulness, compressive quality is decreases.

[4] Johnston and Skarendahl, (1992).It up to a volume part of 0.1% doesn't influence the compressive quality. At the point when tried under pressure, disappointment happens at or not long after the pinnacle load giving next to no durability. It is discovered that the strands have next with no impact on compressive quality determined from the pinnacle load, and both slight increment and diminishing in quality have been accounted for with increment in fibre content. The decline in quality is generally contemplated because of the inadequate union.

[5] Vikrant S Variegate (2012) et al this paper manages Experimental examination for M-20 evaluation of cement to consider the compressive quality, and elasticity of steel fibre strengthened cement perspective proportion were utilized. In this information acquiredand investigated and contrasted. A connection between Compressive quality versus days and elasticity versus days spoke too graphically. Result information unmistakably shows rate increment in7 and 28 days' Compressive quality and Tensile quality for grade ofM-20.

The purpose of this experimentis to discover the consistency characteristics of reinforced steel fibre cement with different polypropylene filament rates of 0%, 0.8%, 1.8%, 2.8% and 3.8%by volume of concrete and thus to appear at the ideal level of steel filaments. The goal of the study was to achieve the highest quality of cement by using ideal polypropylene filament loads. TheElectricity properties of fibre reinforced concrete arecomparedwithnormalconcrete without anyfibres.To sign in the effect of Polypropylene fibre of M30 blend concrete.

METHODOLOGY

Cement

In this test fifty-three grade regular Portland cement become used for mixing concrete. The bodily residences of cement used.

Physical Properties are as follows;

Sl. No	Properties	Value	IS Specification and Test Procedure
1	Specific gravity	3.125	IS:4031
2	Fineness modulus	2%	IS:4031 & IS269
3	Initial Setting time in minutes	60	>30, IS:4031 & IS269
4	Final Setting time in minutes	260	<600, IS:4031 & IS269

Fine Aggregate

The nice mixture used for the take a look at changed into manufactured sand which turned into unfastened from deleterious materials like clay, silt content and chloride contamination. The bodily homes of satisfactory aggregate used.

PHYSICAL PROPERTIES ARE AS FOLLOWS;

Sl No.	Properties	Value
1	Specific gravity	2.67
2	Fineness modulus	2.69
3	Grading of sand	zone II

Coarse Aggregate

It is used for the paintings is of 20mm and 12mm size which is loose from deleterious materials like clay, silt content and chloride contamination.

PHYSICAL PROPERTIES ARE AS FOLLOWS;

Sl No.	Properties	Value
1	Specific gravity	2.49
2	Fineness modulus	4.66

STEEL FIBRES AND POLYPROPYLENE FIBRES

The length of crimped steel fibers used are 25mm of equivalent diameter 0.5mm. The young's modulus of steel fibers was discovered to be 2×10^5 MPa.

The density of steel fiberwas discovered tobe7900N/m^3.TheENDURO-600macrosyntheticpolypropylenefiberswerehavingalength of50mmandtheiraveragethicknesswasdeterminedtobe1mm.Thedensity of polypropylene fibers was determined to be 9460N/m^3.

Figure 1: PolypropyleneFibresFigure

Figure 2: Crimped SteelFibres

Concrete Mix Design

Mix design was done as per IS 10262. The high-quality plasticizer dosage became adopted as 1 % of cement.

Table: Mix Proportion for M30

Material	Calculated Quantity
Cement	437.77 kg
Coarse aggregate : 20 mm (60%)	733.8 kg
Coarse aggregate : 12 mm (40%)	489.2 kg
Fine aggregate	655.175 kg
Water	197liters

TESTING PROCEDURE

Concrete test specimen includes 150x150x150mm cubes, in this we have used Cylinders as size of dia 150mm and height is 300mm. Concrete dice specimen have been examined at 1 week and 4 weeks to obtain the compressive energy of concrete. Cylindrical specimen has been tested at 1 week and 4 weeks to acquire the split tensile strength of concrete.

Experimental results

Compressive Strength (C.S.) Test Results

The following desk gives the overall outcomes of compressive power for bolstered concrete with metallic and polypropylene fibers reinforced concrete. The table additionally gives the percentage growth of compressive electricity with admire to standard strengthened concrete (reference mix).

OverallResults are observed in below;

C.S.after 3 days in Mpa

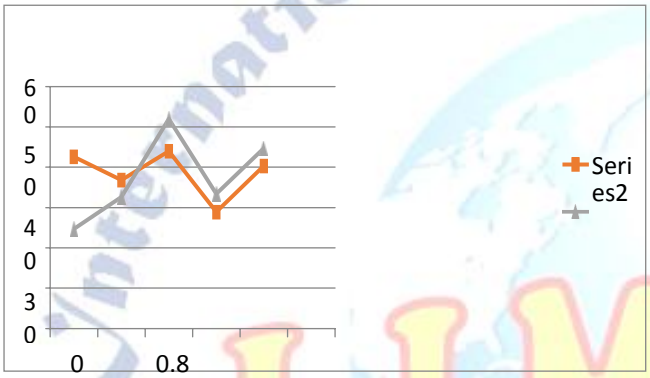
	Percentage of POLYPROPYLENE replaced				
Percentage of fiber	0	0.8	1.8	2.8	3.8
0	32.99	27.61	27.52	24.54	39.48
1	31.54	28.56	22.96	27.23	44.11

Graph 1 of Compressive Strength After 3 Days in MPA

COMPRESSIVE STRENGTH AFTER 14 DAYS IN MPA

	Percentage of POLYPROPYLENE replaced				
Percentage of fiber	0	0.8	1.8	2.8	3.8
0	42.58	36.78	44.20	28.89	40.1
1	24.73	32.62	52.10	33.39	44.9

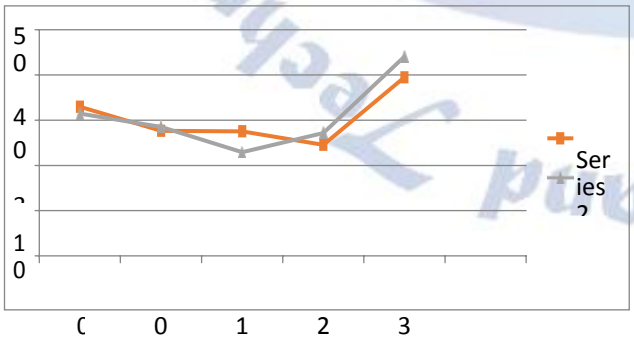
Compressive Strength After 14 Days in Mpa

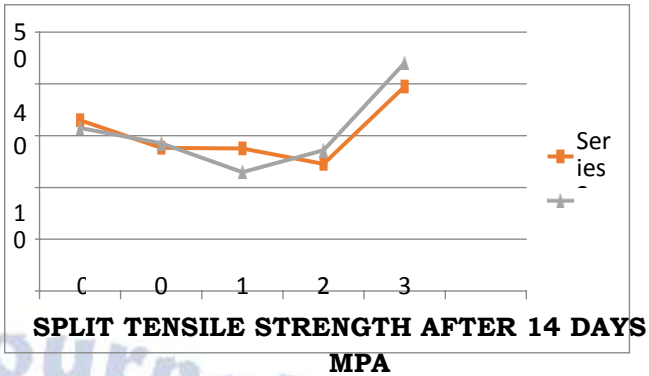


SPLIT TENSILE STRENGTH AFTER 3 DAYS IN MPA

	Percentage of POLYPROPYLENE replaced				
Percentage of fiber	0	0.8	1.8	2.8	3.8
0	2.10	2.31	2.45	1.67	1.95
1	2.48	2.0	2.20	1.80	2.21

SPLIT TENSILE STRENGTH AFTER 3 DAYS IN MPA





SPLIT TENSILE STRENGTH AFTER 14 DAYS IN MPA

	Percentage of POLYPROPYLENE replaced				
Percentage of fiber	0	0.8	1.8	2.8	3.8
0	2.15	3.10	2.89	2.90	2.06
1	1.53	3.05	2.90	1.80	3.10

CONCLUSIONS

- After performing the series of tests, we have concluded that our project was able to achieve the higher strength in compression, and tension as compares to the control sample andand on the identical time making it greater economical.
- Due to the replacement of cement with POLYPROPYLENE, we were able to achieve higher creep.
- Maximum strength is attained at 1.8% of POLYPROPYLENE and 1% of hybrid fibres (0.75% steel and 0.25% Polycarboxylic ether) after 14 days of curing.
- Maximum tensile strength with hybrid fibre is attained at 3.8% of POLYPROPYLENE and 1% of hybrid fibre (0.75% steel and 0.25% Polycarboxylic ether) after 14 days of curing.

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