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Mechanical Properties of Concrete Using Oyster Shells as Coarse Aggregate

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Abstract. In order to investigate the recycling possibilities of coarse oyster shell aggregate, the chemical compound of oyster shell and reactivity of oyster shell with cement paste was examined. Specifically, the mechanical characteristics of fresh concrete and hardened concrete were quantified in terms of oyster shell substitution rates. Test results indicate that there is no interaction between oyster shell and cement paste and that concrete's workability decreases as the substitution rate for oyster shell increases. The decrease was about 20% at a substitution rate of 30%.

Introduction

Concrete is one of the most important materials in developing nations, as the construction industry is the backbone of all other industries. As the most consumed building material, concrete production depends on cement, sand, fine aggregates, and coarse aggregates. As the consumption of concrete grows, the demand for coarse aggregate increases in countries with high infrastructure growth. The mechanical properties of oyster shell make it a suitable substitute for coarse aggregate. Sieved shells can be used for both the waste industry and construction industry. In order to increase the strength of concrete, oyster shell will be added in different variations of 20% and 30% to M20 grade of concrete. Aggregates are inert filter materials of either the coarse or fine variety. Several studies suggesting that Indian oyster shell can be used as a construction material have recently been conducted. Greater usage of oyster shells will cause now no longer most effective saving such creation fabric however additionally assists in fixing the hassle of disposal of this waste products. So, the maximum economical, ecological and boom the convenience of labor creation of the shape is crucial within side the gift economy.So the characteristic of concrete has come into the sector.

As modern engineering practices become extra traumatic, there's a corresponding need for unique forms of cloth with novel residences. Such materials are called composite cloth as it's miles a aggregate of various substances. As current engineering practices grow to be extra traumatic, there's a corresponding need for special sorts of cloth with novel houses.Scientists, engineers and technologists are constantly on the attempting to find substances, which can act as substitute for conventional materials or which own such homes as could allow new design and innovations resulting in to financial system, in order that a shape can be built economically. Many attempts were combination of or extra materials. Such substances are called composite cloth as it's far a combination of different substances.

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Materials Testing Program

That allows you to observe the conduct of concrete produced with locally available oyster shell and also recognize the pressure –pressure conduct of a light weight concrete a total number of cube 6 and beam 6 mixes were tried. Six mixes of concrete with 20%,30% extent of oyster shell. And ultimate of coarse aggregate and first-class combination a complete wide variety of 12 specimens became prepared. In all the mixes the equal type of high-quality aggregate i.e. easy river sand has been used.

Oyster Shell

The domestically to be had crushed oyster shell has been used as a rough aggregate on this research. The maximum mixture length of 20mm is used. The experiments are executed to locate the residences of oyster shell i.e,sieve evaluation, particular gravity, density and water absorbtion.The take a look at has been accomplished as according to the process given in IS code.

Figure 1 Oyster Shell

Table 1 Specific Gravity of Fine Aggregate

Sample Number	W1 in kg	W2 in kg	W3 in kg	W4 in kg	Specific Gravity
1	0.632	1.120	1.802	1.512	2.4
2	0.632	1.128	1.746	1.512	2.0
3	0.632	1.122	1.838	1.512	2.8
				Average	2.4

Table 2 Specific Gravity of Coarse Aggregate

Sample Number	W1 in kg	W2 in kg	W3 in kg	W4 in kg	Specific Gravity
1	0.632	1.110	1.702	1.512	2.6
2	0.632	0.978	1.746	1.512	3.0
3	0.632	1.132	1.738	1.512	2.7
				Average	2.6

Table 3 Specific Gravity of Oyster Shell

Sample Number	W1 in kg	W2 in kg	W3 in kg	W4 in kg	Specific Gravity
1	0.632	1.714	1.960	1.512	1.68
2	0.632	1.888	2.060	1.512	1.75
3	0.632	1.980	2.306	1.512	2.37
				Average	1.93

Table 4 Sieve Analysis of Oyster Shell

IS Sieve size	Weight retained (gm)	% weight retained	Cumulative % of weight retained	Cumulative % of passing
80mm	0	0	0	100
40mm	98	98	4.9	95.1
20mm	1590	1688	84.5	15.6
10mm	305	1993	99.75	0.35
4.75mm	7	2000	100	0
2.36mm	0	-	100	-
1.16mm	0	-	100	-
600 mic	0	-	100	-
300 mic	0	-	100	-
150 mic	0	-	100	-
Total	2000	-	822.95	-
Fineness modulus of coarse aggregate = 7.32				

Compressive Strength Testing

Table 5 Compressive Strength of Concrete at 7 Days Curing

Specimen no.	Load (kN)	Compressive strength (N/mm^2) 7 days curing	Type of specimen
1	385	17.11	Conventional concrete
2	380	16.88	Oyster shell concrete 20% replacement
3	382	16.97	Oyster shell concrete 30% replacement

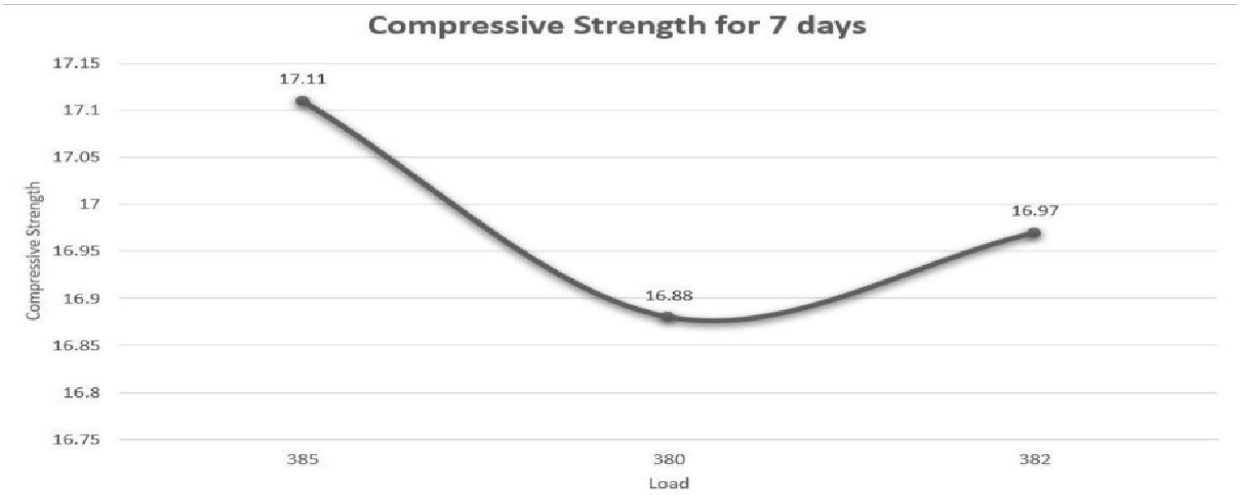

Figure 2 Compressive Strength Graph For 7 Days of Curing

Table 6 Compressive Strength of Concrete at 28 Days of Curing

Specimen no.	Load (kN)	Compressive strength (N/mm^2) 28 days curing	Type of specimen
1	619	27.51	Conventional concrete
2	588	26.13	Oyster shell concrete 20% replacement
3	610	27.11	Oyster shell concrete 30% replacement

Figure 3 Compressive Strength Graph For 28 Days of Curing

Table 7 Flexural Strength of Concrete at 7 Days Curing

Specimen no.	Load (kN)	Flexural strength (N/mm^2) 7 days curing	Type of specimen
1	5.16	2.58	Conventional concrete
2	4.72	2.36	Oyster shell concrete 20% replacement
3	4.20	2.1	Oyster shell concrete 30% replacement

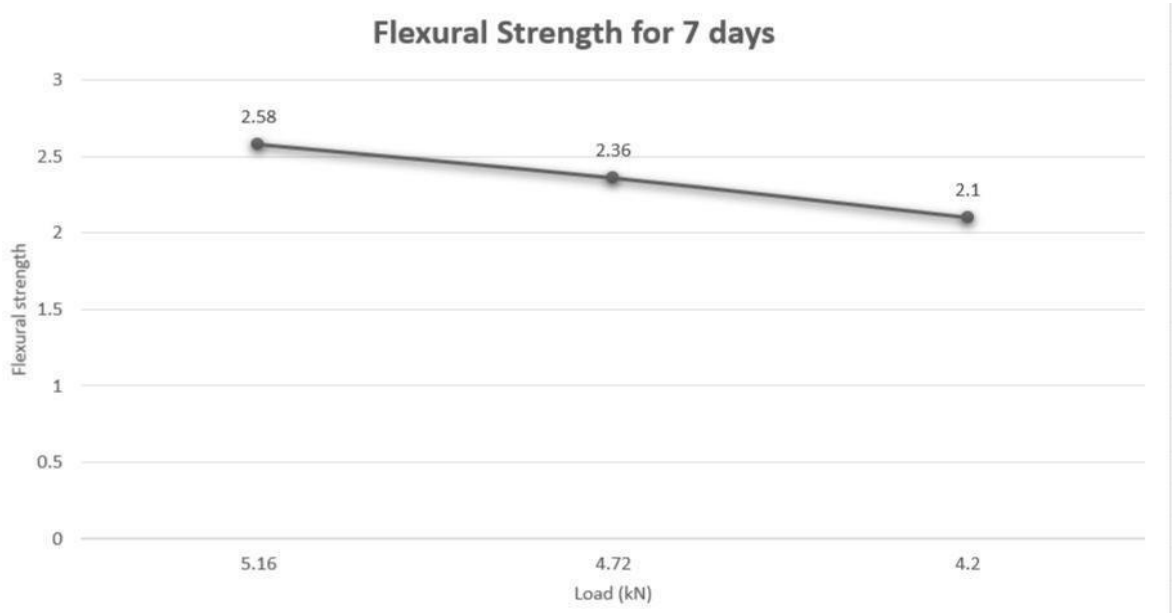

Figure 4 Flexural Strength Graph For 7 Days of Curing

Table 8 Flexural Strength of Concrete at 28 Days Curing

Specimen no.	Load (kN)	Flexural strength (N/mm^2)28 days curing	Type of specimen
1	8.32	4.16	Conventional concrete
2	7.46	3.82	Oyster shell concrete 20% replacement
3	7.40	3.71	Oyster shell concrete 30% replacement

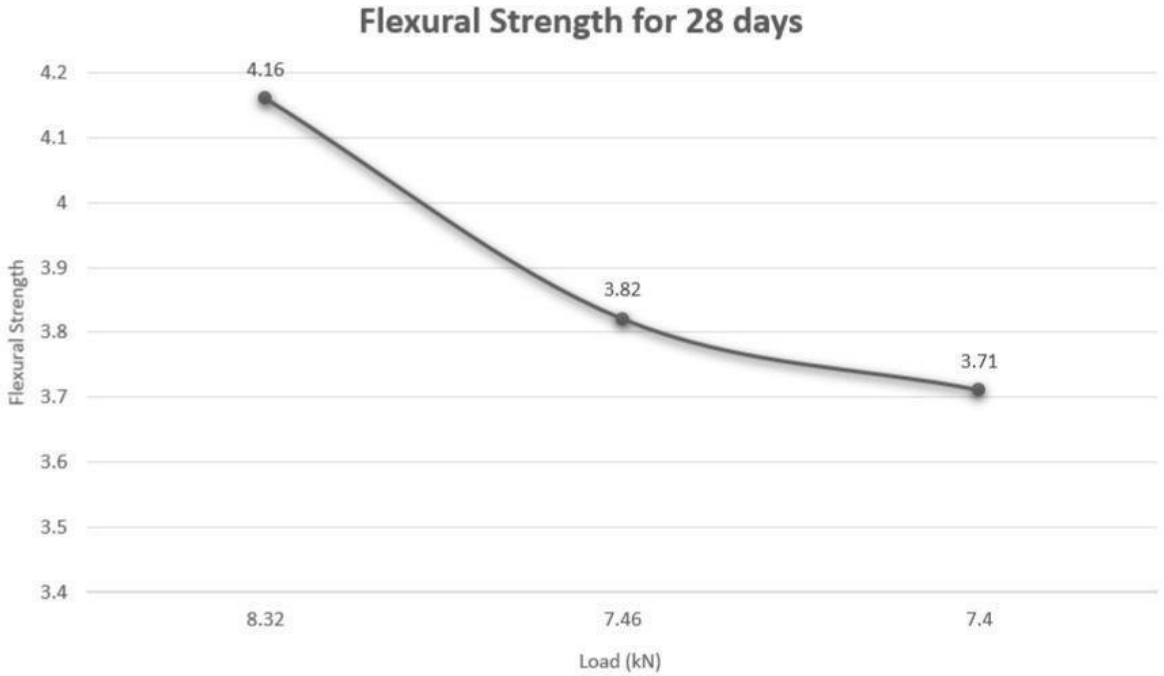

Figure 5 Flexural Strength Graph For 28 Days of Curing

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Summary

It has been determined that by using growing the oyster shell content material the electricity values tend to increase. in this project we attempted to replace the coarse combination partially via oyster shell (20%, & 30%) respectively to increase the energy of concrete. but the strength is equal with the traditional concrete only at 20% replacement of mixture via oyster shell as a result increasing the amount of oyster shell past 20% reduces the compressive and flexural too. these project paves a way for defensive our grave which is one of the renewable electricity supply and make a 20% cut off in construction field. The power is progressively decreasing at 30% replacement of oyster shell. So we finish that the coarse mixture changed with oyster shell at 20% in concrete is suitable

for creation. Furthermore it reduces the development fee by way of lowering the cost of coarse combination and it also reduces the environmental pollutants because of oyster shell.

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