BEHAVIOUR ON CONCRETE WITH RECYCLED AGGREGATES AND CEMENT WITH METAKAOLIN

A.Medhasri Mrunalini
Assistant Professor, Department of Civil Engineering, NRI Institute of Technology, Perecherla, Guntur, AP, India.
Email:nriitchaitanya123@gmail.com

G.Hymavathi
Professor and Head, Department of Civil Engineering, NRI Institute of Technology, Perecherla, Guntur, AP, India. Email: koduru_mouli@yahoo.com

Dr. K. Chandramouli
Assistant Professor, Department of Civil Engineering, NRI Institute of Technology, Perecherla, Guntur, AP, India.
Email:nriitchaitanya123@gmail.com

J. Sree Naga Chaitanya
Assistant Professor, Department of Civil Engineering, NRI Institute of Technology, Perecherla, Guntur, AP, India.
Email:nriitchaitanya123@gmail.com

K.GopiKrishna
UG Scholar, Department of Civil Engineering, NRI Institute of Technology, Perecherla, Guntur, AP, India. Email:gochalla692@gmail.com

Abstract

One of the most frequently used building materials worldwide is concrete. The recycling of used concrete has been considerably increased by recent technologies. The availability of destroyed concrete for use as recycled concrete aggregate is growing as a result of the severe lack of natural material. The study discusses both recycled and natural aggregates, as well as the impact of mineral admixture (metakaolin) on strength experiments.To make concrete more durable and strong, include metakaolin in the mix. The replacement of natural aggregate with recycled aggregates was cast in the concrete that was created using M30 grade in the experimental work on the subject. Natural aggregate replacement ranged from 0% to 100%. Metakaolin is utilised in cement as a partial replacement in amounts of 5 percent, 10 percent, 15 percent, and 20 percent for all combinations. After 7 and 28 days of curing, the compressive strength of concrete has been determined and the findings of concrete have been compared. The findings indicate that concrete with 15% metakaolin and 50% recycled aggregates has a high strength. the concrete's split tensile and compressive strengths.

Key words: *Recycled aggregates, Metakaolin, compressive strength, split tensile strength.*

1. Introduction

The problems of waste disposal has grown out of hand in both developed and developing countries, including India. The tremendous quantity of waste volume, the continued use of landfills, the rising cost of transportation, and the disposal of those wastes are the causes of this. The widespread degradation of Natural Aggregate (NA) and the expanding amounts of building and demolition debris being thrown in landfills pose a severe threat to the public's and environmentalists' ambitions for a society free of waste. As a result, the notion of recycling garbage and utilising it once again has grown in acceptance.Recycling also solves the problem of garbage disposal, reduces costs, and conserves natural resource base. The problem noted above pertains to demolition waste created in many countries. As a result, owing to developments in recycling technology, destroyed concrete may now be recycled.

India is likewise seeing a decline in overall reserves.

2.Objectives :The main objective was to study suitability and effect of coarse recycled aggregate in new generation concretes.

1. To optimize the usage of coarse aggregate with recycled aggregates.
2. The strengths are studied at 7 and 28 days of curing.

3. MATERIALS

3.1 Cement: The properties of cement are presented in Table 1.

Table 1 Physical properties of cement

S. No.	Property	Cement (53 grade)
1	Specific gravity	3.16
2	Fineness	9.0%

3.2Fine Aggregate: Crushed stone or natural sand must be used as the fine aggregate in concrete. The fine aggregate density has a considerable impact on the hardened characteristics of the concrete.

3.3 Coarse aggregate: Coarse aggregate is defined as aggregate that is maintained over IS Sieve 4.75 mm. According to IS 383:1970, the typical maximum size is progressively 10–20 mm.

3.4. Water: One of the most crucial materials in construction, water is needed for a variety of tasks like making mortar, mixing cement concrete, and curing work. The strength of the motor and cement concrete in the building project is directly influenced by the quality of the water utilised.

4. Experimental Investigations

4.1 Compressive Strength test

The cube specimens of 150mm x 150mm x150mmwere cast and tested in compression testing machine for 7 and 28days of curing period for different proportions of concrete mix and presented.

Table 2: - Compressive strength of concrete with recycled aggregates and cement with metakolin.

MIX	Compressive strength,N/mm^2	
	7 days	28 days
NC	27.07	39.30
MK5	31.97	45.81
MK10	33.63	48.06
MK15	34.54	49.50
MK20	32.81	48.33
RCA50	23.28	33.80
MK15RCA50	31.78	46.88
RCA100	20.42	29.69
MK15RCA100	27.64	40.89

4.2. Split tensile Strength test

Table 3: - Spli tensile strength of concrete with recycled aggregates and cement with metakolin.

MIX	Split tensile strength,N/mm^2	
	7 days	28 days
NC	2.62	3.81
MK5	3.16	4.53
MK10	3.26	4.66
MK15	3.36	4.82
MK20	3.23	4.77
RCA50	2.27	3.30
MK15RCA50	3.09	4.56

RCA100	2.01	2.93
MK15RCA100	2.69	3.99

5. Conclusions

n this study, the concrete ingredients like cement are partially replaced by metakaolin and coarse aggregates are partially replaced by recycled aggregates respectively. Metakaolin various different percentages of 5%, 10%, 15%, 20% and recycled aggregates is various from different percentages of 0%, 50%, 100%.

1. At 15% partial replacement of metakaolin with cement the compression strength of concrete at 7 and 28 days are 34.54and 49.50N/mm^2.
2. At 15% partial replacement of metakaolin with cement the split tensile strength of concrete at 7 and 28 days are3.36 and 4.82N/mm^2.
3. At 50% partial replacement of recycled aggregates with coarse aggregate the compression strength of concrete at 7 and 28 days are 23.28and 33.80N/mm^2.
4. At 50% partial replacement of recycled aggregates with coarse aggregate the split tensile strength of concrete at 7 and 28 days are 2.27 and 3.30N/mm^2.
5. At 15% partial replacement of metakaolin with cement and 50% partial replacement of recycled aggregates with coarse aggregate the compression strength of concrete at 7 and 28 days are 31.78 and 46.88 N/mm^2.
6. At 15% partial replacement of metakaolin with cement and 50% partial replacement of recycled aggregates with coarse aggregate the split tensile strength of concrete at 7 and 28 days are 2.69 and 3.99 N/mm^2.

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