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Experimentation on Partial Replacement of Coarse Aggregates with Ceramic Tile Pieces in Concrete

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Abstract

The utility of recycled ceramic waste as partial replacement for coarse aggregates in concrete has been investigated. Ceramic tile waste pieces left over after fixing the tiles have been used for the investigation. Concrete mixes with a 28 days characteristic strength of 25 MPa were prepared using water / cement ratio of 0.4. The strength development of the concrete mixes containing ceramic tile pieces was compared to that of conventional concrete. The results show that the concrete mixes containing ceramic tile aggregates achieve strength levels between 80 to 95 % compared to conventional concrete. This indicates that the recycled ceramic waste has a potential to be used as coarse aggregates in concrete. The results of experiments indicated an optimum of 10% replacement of ceramic tile pieces as coarse aggregate content in concrete.

Keywords: *Ceramic tile pieces, concrete, compression, split tension.*

INTRODUCTION

Sustainable development of the cement and concrete industry requires the utilization of industrial waste components. At present, for a variety of reasons, the concrete construction industry is not sustainable. Firstly, it consumes huge quantities of virgin materials which cannot remain for next generations. Secondly, the principal binder in concrete is Portland cement, the production of which is a major contributor to greenhouse gas emissions that are implicated in global warming and climate change. Thirdly, many concrete

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Rice Husk Ash as Supplementary Cementitious Material

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Abstract

The current paper addresses the potential use of Rice Husk Ash (RHA) as a cementitious material in concrete mixes. Cement is generally noted to be the costliest constituent of concrete. The whole construction industry is looking for a reasonable byproduct that would limit the utilization of cements and eventually decrease the construction cost. Rice husk ash (RHA) which has the pozzolanic properties is one among the best options. In this experimental work, an attempt is made to utilize rice husk ash as a partial substitute of cement in concrete. M30 grade of concrete is designed as per the guidelines of IS: 10262 – 2009 and IS: 456 – 2000. Ordinary Portland cement (OPC) was supplanted with Rice husk Ash (RHA) by weight at 0%, 5%, 10%, 15%, 20% and 25%. Tests were performed on fresh and hardened concrete. Physical tests carried out were slump test on fresh concrete and Compressive Strength test and split tensile strength tests were performed on hardened concrete at 7, 14 and 28 days of curing. The test outcomes revealed an optimum strength at 20% replacement level beyond which the strength reduced gradually with the replacement of OPC with RHA.

Keywords: *Concrete, Ordinary Portland cement, Rice husk ash*

INTRODUCTION

Concrete is the most widely used man-made construction material and is second only to water as the most utilized substance on the planet (Gambhir, 2005). It is obtained by mixing cement, water, coarse aggregate and fine aggregate (and sometimes admixtures) in required

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Plastic a Coarse-Aggregate in Concrete

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ABSTRACT

Plastic waste management and recycling are expanding due to the material's high hazard levels and value as a resource for the computer industry. Using plastic garbage to address environmental and ecological issues is just a partial solution. Because it offers strong resistance to structures and routes, plastic garbage will lower total costs. This will conserve energy and reduce the expense of land-filling. Plastics are non-biodegradable materials that are utilised as a part of replacement for boulder aggregates. Plastic waste is discarded plastic waste. A practical study done on the utilisation of useless particles as boulder aggregates in concrete mixture with a replacement ratio from 0%, 10%, 20%, 30% based on strength properties criterion for M30 Concrete. In the current study, mixing compression resistance was examined, and 10% replacement provided excellent stability and compression resistance.

Keywords- Coarse aggregates, Conserve energy, Ecological issues, Resistance, Waste management

INTRODUCTION

Recycling, reusing, or otherwise getting rid of plastics that are also valuable. The irregular treatment of plastic rubbish can have significant detrimental impacts on health [1] and the environment since it is not governed by official regulations in poor nations.

Hazardous environmental pollutants found in plastic. Even in industrialized nations, trash disposal operations have the potential to pose serious risks to community members and workers, so considerable care is taken to avoid harmful contact. Recycled plastic is one of the new wastes used by the concrete industry. Recycling of reclaimed plastic from the concrete industry has been thought to be the most effective way to treat the elimination of huge quantities of matter. In concrete, recycled plastic pellets are present. It is crucial to state that the high cost of transportation and how it affects the cost of production overall mean that recycling waste does not yet yield financial rewards. Recycling is to remove used materials [2] from the waste stream and reuse them in the production process. Polymer is growing in acceptance due to its advantageous qualities, which include:

- Lower density than comparable materials reduces the amount of fuel consumed during transport.
- Reliability and dependability.
- Resistance to chemicals, liquid and impact.
- Exceptional insulation qualities.
- Melting temperature, bonding strength gets stronger as temperature rises.

Defect

Because to plastics' weak bonding properties, a component of concrete's compression barrier is lost.

Objectives

- Swap out coarse aggregate for trash to show how waste can be disposed of as waste management technology advances.
- To lessen contamination from recycling waste in the unclean region and to test the concrete's compressive strength using plastic aggregate.

EXPERIMENTAL PROGRAMME

To compare [3] the qualities of concrete using and without the usage of plastics as coarse particles, experimental software was created. The following Table 1 discusses the key tests on materials including cement, sand, and aggregates in use for casting specimens were casted as well as their results.

EFFECT OF REPLACING SAND WITH BRICK AGGREGATES IN SELF-COMPACTING CONCRETE

By

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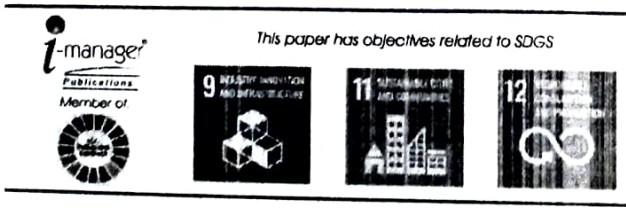
ABSTRACT

Numerous studies have been made by the concrete researchers on replacing fine aggregate with construction and demolition waste, but possibly only few materials have been proved to be successful replacement materials for natural fine aggregate in concrete. The present paper explores the results of replacing river sand with Brick Aggregate (BA) which is available in the form of construction waste. The mechanical and microstructural properties of self-compacting concrete by partially replacing river sand with brick aggregate are examined and is compared with Self Compacting Concrete (SCC). The test results showed that the strength achievement of brick aggregate concrete is comparable to self-compacting concrete and the microstructural properties have shown that the brick aggregate has an advantage of internal curing effect.

Keywords: Concrete, Brick Aggregates, Flowability, Strength, Internal Curing Effect.

INTRODUCTION

The concrete being the most preferred material for construction purpose all over the world is becoming threatened because of the scarcity of the supplies of the constituents used in the concrete, which contributes to environmental degradation. The disposal of solid waste has been a big burning problem for every nation in the present period. Recycling the solid waste could be one of the best approaches in reducing the land disposal. Around 150 million tons of construction and demolition waste produced in India (Jain et al., 2019). A large number of research work is done on waste clay brick that is used as coarse aggregate to produce the concrete (De et al., 2005; Gomes & De 2009; Masum and Manzur, 2019) in their findings shows under different curing conditions, the corrosion initiation time and extension of life of concrete by Brick Chips and Stone Chips as Coarse aggregate, the samples with (20% BC & 80% SC) showed good resistance to chloride diffusivity for 0.4 w/c ratio. In one of the studies done by Uddin et al. (2017), the Maximum Aggregate Size (MAS) of brick on properties of self-compacting concrete were examined. The brick aggregate size varies from 12.5 to 50 mm. This study concludes the strength could be achieved up to 35 mm size of brick aggregate. Cachim, (2009) concluded that the water absorption of bricks results in internal curing effect and therefore addition of bricks acts as self-curing agent for concrete. Zong et al., (2014) explains from the microscopic studies that the crushed coarse aggregate being porous in nature form's loose structure, resulting in strength and durability reduction. On the other hand, Yang et al. (2011) in their research emphasizes that the permeability of concrete increases with the inclusion of clay bricks as coarse aggregate. But the strength of concrete produced is very good with 20% clay brick addition. Zaichenko et al., (2015) in their research found out that the light weight aggregate contributes in the internal curing of concrete. Dominic et al., (2018) had



CONSEQUENCES OF USING GGBS AND M-SAND ON THE PROPERTIES OF HIGH STRENGTH CONCRETE

By

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ABSTRACT

Complimentary cementitious materials have occupied a pivotal position in the production of high-strength concrete blends as a substitute for binding components. These additional cementing compounds have been used in concrete for decades and their effects are well known and understood. The practise of using supplementary cementitious materials in the construction sector is favorable to concrete technologists, which generally results in a lower cost of concrete production without compromising on the short-term and long-term attributes of concrete. One of the well-known cementitious materials like Ground Granulated Blast Furnace Slag (GGBS), which is obtained as a by-product of steel producing units, is being used as partial substitute of cement in producing M60 grade of high strength concrete. The present work is focused on the utilization of manufactured sand and stone powder as finer aggregate content and GGBS as a fractional binding element. Various tests were performed to find the mechanical properties and microstructure of high strength mixes. The analyses revealed that GGBS made significant contributions to the mechanical properties of concrete through void filling ability and the formation of calcium-silicate-hydrate gel. The micro-structural tests performed through scanning electron microscopy and X-Ray Diffraction (XRD) analysis revealed the dense microstructure of the high-strength mix of concrete at 45% substitution levels of GGBS.

Key words: Ground Granulated Blast Furnace Slag, High-Strength Concrete, M-Sand, Stone Dust. Schematic Design (SD), Calcium Silicate Hydrate (CSH), Energy Dispersive X-Ray Analysis (EDX).

INTRODUCTION

The developments in the production of high-strength concrete and its successful use in skyscrapers over the last few years are well known. In the recent past, concrete with a strength of about 138 MPa has been used in high-rise buildings and in some bridge structures built in Europe. For specific purposes, concrete with a strength of more than 800 MPa has been developed in France. This type of special concrete is widely used in civil engineering applications because the mechanical and rheological attributes of high-strength concrete are better than those of ordinary conventional concrete. High strength can be achieved by reducing porosity and microcracks in the transition zone. High strength in concrete can be achieved by using pozzolans, mineral admixtures, chemical admixtures and supplementary cementitious materials like fly ash, silica fume, ground granulated blast furnace slag and zeolite. Most of these materials are industrial by-products, eco-friendly, less energy-intensive and help in reducing the cement content required in concrete (Bache, 1987; Farney & Panarese, 1994; Gjorv, 1992; Godman & Bentur, 1989; Mehta & Monteiro, 1993;

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This paper has objectives related to SDGS

BIAXIAL COLUMN DESIGN USING VISUAL BASIC 6.0

By

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ABSTRACT

Computers have been playing an important role in Civil engineering discipline. The aid of programming languages is unfathomable in designing the Civil engineering structures like buildings, hydraulic structures etc. In this paper, the design of biaxial rectangular or square column is performed for three different columns for different ultimate loading and ultimate moments by an educational software written in Visual Basic (VB) 6.0. The user interface of this software gives results of percentage of minimum steel, area of the steel and orientation of steel bars in bi-axial column. The students expressed their improvement after introducing this robust software. The understanding level of subject by students is analyzed before and after using this software is presented in this paper.

Keywords: Biaxial Column, Graphical User Interface, Visual Basic 6.0, Ultimate Loading, Ultimate Bending Moments.

INTRODUCTION

The vertical compression elements that transport loads from the higher floors to the lower levels and to the ground via the foundations are referred to as columns (Al-Ansari & Senouci, 1999). Columns may be divided into two categories: those that are loaded concentrically, as shown in Figure 1, or those that are loaded eccentrically, as shown in Figure 2, depending on whether or not bending moments are present. In addition to being susceptible to axial force, columns that are loaded eccentrically are also subject to moments. It is possible to translate the moments into a load of P and eccentricities of e_x and e_y. It is possible for the moments to be uniaxial, such as in the situation when two neighboring panels are not loaded in the same manner, as shown by columns A and B in Figure 3. When bending occurs in both the x and y axis, as shown in the case of the corner column C in Figure 3, a column is said to be loaded in both directions, or bi-axially loaded (Al-Ansari et al., 2019).

The strength of a Reinforced Concrete (RC) column is often depicted using interaction diagrams to establish a relationship between the design axial load (P_u) and the design bending moment (M_u) (Al-Ansari et al., 2019). Numerous academics have done substantial work investigating the biaxial interaction diagrams of RC rectangular columns (Fleming & Werner, 1965; Hsu, 1988; Interaction Diagram - Tied Reinforced Concrete Column, n.d.; Rodriguez & Aristizabal-Ochoa, 1999; Ross & Yen,

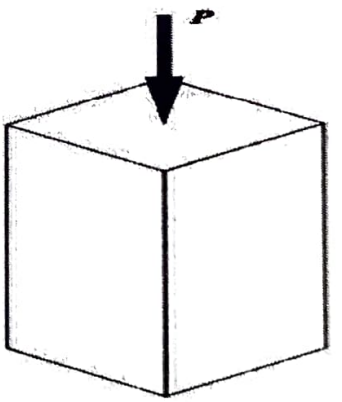

Figure 1. Concentrically Loaded Columns

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Evaluation of zeolite as supplementary cementing material

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ABSTRACT

The current paper researches the impacts of including zeolite in M30 grade of concrete mix as a plausible type of pozzolanic material. Pozzolans comprise of incredibly fine particles of siliceous and aluminous based materials. They rarely possess little or no binding ascribes, but in the presence of water, they respond with calcium hydroxide to create cementing compounds. Zeolite is one among the natural pozzolanic materials which has been successfully utilized to supplant the cement content fractionally in preparation of mortar or concrete elements. The objective of this experimentation is to replace cement content with zeolite which is accessible in the vicinity, and to concentrate on its impact on the mechanical properties of concrete. The construction industry has been hit hard with skyrocketing prices and severe shortage of natural river sand across many parts of the nation. Hence an attempt is also made to utilize manufactured sand instead of natural river sand. The incorporation of zeolite up to the degree of 15% resulted in an optimum magnitude of mechanical strengths of the concrete blend.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Materials and Manufacturing for Sustainable Developments – 2022.

1. Introduction

Zeolite tuffs have been used as a construction material since olden days. Zeolite has been utilized as light weight aggregates, foaming agents and cement replacing materials in concrete creation. It contains sufficient amounts of silicon dioxide and aluminium trioxide. In late past, various mineral admixtures like fly ash, silica fume, GGBS, rice husk ash, coal bottom ash and Metakaolin have been analyzed as cement substitutes [1,2]. Nowadays, zeolite is also broadly utilized as cement replacing materials in production of concrete components. It was accounted that out of the yearly output of 200 million tons of cement in China; more than 20% of the cement was replaced with zeolite [3]. It is not only used in ordinary and standard concretes but also finds it track in high-strength and high-performance concretes. High-performance concrete with strength over 80 MPa has been produced by integrating zeolite as cementing compound [4]. Zeolite, if treated properly may also be utilized in producing cellular concrete with superior qualities [5]. It can also forestall the expansion of concrete due to alkali-silica reaction and can control the slump loss in high-strength concrete, if utilized as a carrier for plasticizers [6,7]. Zeolites are alumino-silicates of alkaline earth cations of calcium, sodium and potassium. The fundamental quality of zeolite is its open structure and ability to retain cations and water in itself and give them up without modifying its structure. As a part of tecto-silicate category, they belong to the classification of sedimentary rocks. They are considered as hydrated aluminium tectosilicates where aluminium replaces silicon at the focal point of the tetrahedrons while alkaline cations form open structures. The general formulation of zeolite is:

$$AxByO2c{\cdot}nH2O$$

A: Ca, K, Na, Ba
B: Al and Si
n: variable dependent on type of zeolite

The framework of zeolite consists of interconnected channels of cations with potassium, sodium, magnesium and calcium. These are mobile cations and can be interchanged for other cations. The international zeolite association defines zeolite as structure linked with tetrahedrons that contain cavities occupied by water molecules and cations. Zeolite is crystalline yet they exhibits pozzolanic nature of reactivity [8]. The reaction of lime present in zeolite is comparable with silica fume and it was found to be higher than fly ash [9]. The calcium hydroxide created during the hydration

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Seismic behaviour of elevated liquid storage tanks by considering the different soil types using MATLAB software

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ABSTRACT

For a structure the soil structure interaction (SSI) is the connection between the super structure and the foundation. In this paper, the seismic responses of liquid storage elevated tank with SSI and without SSI effects are considered and effects were analysed. The consequences of SSI on peak seismic responses of tank like displacement, overturning moments are discussed. Furthermore, the impacts of different factors such as slenderness ratio and time period of liquid tank staging on the seismic performance of the raised tank are investigated. From the study it is observed that the soft soil is prone to overturning moment of water storage tank and also found that as the slenderness increases, the overturning moment decreases gradually irrespective of soil type and time period of the staging.

1. Introduction

Large-capacity ground-supported cylindrical tanks are used to store a wide range of liquids, including water for drinking and fire fighting, petroleum, chemicals, and liquefied natural gas. Water is utilized for both of these purposes since it can be used for both drinking and fighting fires. It is very necessary for contemporary facilities to have tanks that can work well even amid intense ground shaking. In the wake of previous earthquakes, substantial damage was inflicted upon storage tanks that lacked proper planning or attention to detail [1,2]. These tanks are needy at natural disasters like earthquakes, floods and droughts to supply drinking water, gasoline in the affected areas. But due to earthquakes especially the elevated water tanks damaged considerable extent [3,4] and therefore, it is very indispensable to probe the behavior of raised water tank under earthquakes. Housner [5] developed theoretical lumped mass model of ground supported liquid storage tank with two-degrees-of-freedom, which are associated with sloshing mass and impulsive mass, to investigate the seismic response. It is observed that the liquid pressure generated due to earthquake ground motion is very important for seismic design of the tanks. When it came to tectonic analysis of flexible liquid storage tanks in the 1970 s and 1980's, it was normal practice to employ lumped mass models of these tanks. The studies [6,7] were among those who first suggested lumping mass models as a useful tool for studying seismic activity of water tanks. In recent decades [8-13], there has been a lot of focus on improving numerical modelling and evaluating the tectonic performance of raised and ground-supported liquid storage tanks. They mainly focused on peak responses of water tanks considering only liquid-structure interaction only but not considered soil-structure interaction. Several authors [14-21] evaluated the earthquake response of liquid tanks including the foundation SSI. In order to carry out seismic analysis that takes SSI into consideration, the appropriate numerical model and technique has to be devised. It is found that tectonic response of the water tanks dependent upon the soil stiffness of the soil. Cho et al. [22] taken the soil-structure interaction with water tanks presents on the ground. But the behavior of water tanks on the ground is different from elevated water tanks. Hence, the primary theme of this paper is to study the response of the elevated water tanks with and without SSI by considering slenderness ratios of 0.6, 0.85, 1.2, and 1.85. The time period of the staging was considered for different types of soils according to Indian standards. The modelling of an elevated water tank is discussed in Section 2 and Section 3 explains how to model a water tank with soil structure interaction. The numerical model details of the water tank described in Section 4 and the results showed in the Section 5.

2. Modelling of fixed elevated water tank

The present study made use of a circular water tank with a wall composed of reinforced cement concrete (RCC). The dimensions of the tank are classified by its slenderness ratio(S), which is the ratio

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ROLE OF RICE HUSK ASH AS SUPPLEMENTARY CEMENTITIOUS MATERIAL IN CONCRETE

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ABSTRACT

Rice husk ash was utilized as a fractional replacement for ordinary Portland cement (OPC) in this experimental study to explore the mechanical and durability ascribes of concrete. The investigation of the experimental outcomes on concrete with a fineness modulus of 11200 cm^2/g and a rice husk ash content of 15% in a chloride environment revealed that rice husk ash improves the mechanical properties, durability in relation to chloride ion migration and oxygen permeability. Based on the results of the investigations, it is possible to draw the conclusion that Rice husk ash is relevant to create concrete whose qualities are significantly superior to those of the referral concrete (RC).

Keywords: Compression, Rice husk ash, Split tensile strength, Oxygen permeability

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1. INTRODUCTION

In recent past, many studies have experimentally proved that supplementary cementitious materials may be utilized to modify the properties of fresh and solidified concrete [1-2]. In addition to improved engineering and performance properties, the use of additional cementing materials was significantly influenced by economic and environmental considerations. Rice husk ash is produced in processing plants through burning of raw rice husk. It is one of the materials that have multiple negative effects on health and the environment. The process of disposing of rice husk ash produced by the marble industry is one of the current environmental issues [3]. The incorporation of rice husk ash into the concrete has received insufficient attention.

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ROLE OF KADAPA MARBLE POWDER AS MINERAL ADMIXTURE IN HIGH STRENGTH CONCRETE

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ABSTRACT

Kadapa marble powder was utilized as a fractional replacement for ordinary Portland cement (OPC) in this experimental study to explore the mechanical and durability ascribes of high strength concrete. The investigation of the experimental outcomes on concrete with a fineness modulus of 11300 cm^2/g and a marble powder content of 15% in a chloride environment revealed that Kadapa marble powder improves the mechanical properties, durability in relation to chloride ion migration and oxygen permeability. Based on the results of the investigations, it is possible to draw the conclusion that Kadapa marble powder is relevant to create high strength concrete (HSC) whose qualities are significantly superior to those of the referral concrete (RC).

Keywords: Compression, Marble Powder, Split Tensile Strength, Oxygen Permeability

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1. INTRODUCTION

High-strength cement-based materials are expected to be used on large scale in the construction sector due to an increase in global demand. In recent past, many studies have experimentally proved that supplementary cementitious materials may be utilized to modify the properties of fresh and solidified concrete [1-2]. In addition to improved engineering and performance properties, the use of additional cementing materials was significantly influenced by economic and environmental considerations. Marble powder is produced in processing plants through the cutting, sawing, and polishing of heavy marble units. It is one of the materials that have multiple negative effects on health and the environment.

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Concrete making using salt water instead of fresh water

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Flexural strength

ABSTRACT

The second most popular building material worldwide is masonry. Finding a substitute material that is as suited as concrete from a durability and cost perspective is challenging. Concrete manufacturing processes typically use freshwater, as well as for curing purposes. In this research, the consequences of utilizing salty water instead of fresh water (FW) are principally examined, as well as the possibility of doing so. The purpose of this research is to find the mechanical characteristics (MC) of concrete that have been made with FW and saline water (compressive strength (CSS), Split tensile strength (STS), Flexural strength (FLS)). Based on the findings of the present investigation, we deduce that using salt water (SW) for the casting and curing of concrete has no adverse effects on its strength. When casting and curing are done with SW, the strength is raised to some extent, without any loss of strength; this concrete can be utilized for bulk concreting.

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1. Introduction

In development companies, concrete is a main material. It is constructed using predetermined amounts of samples of the following: water, cement, sand, and aggregate. Concrete is used for building worldwide because of its qualities. Concrete is made from non-renewable elements. They are scarcely found in their natural environment. The quantity of water also plays a crucial role in the creation of concrete. Water contaminants may hinder the cement's ability to set and may degrade its strength qualities.

The components found in water can change how the combination sets up and advances in strength. The strength of the concrete also depends on the water's quality. Despite its superior strength and simpler construction, concrete initially deteriorates in a marine environment due to salt water [1]. But due to scarcity of portable water and its shortages may result from overuse. In order to keep this substance from running out, researchers must discover a new substance that is utilized to make concrete without altering its benefits. We'll solely cover the mechanical effects of switching from freshwater to saltwater in this article.

In the housing and construction business people prefer non-portable water [3], concrete is an extremely versatile material. Concrete is the building material that is used the most frequently worldwide because of its benefits. Non-renewable products are used to make concrete. They are scarcely found in their natural environment. Material shortages may result from overuse. We need to find a new material that can be used to produce concrete without changing its qualities in order to prevent this material from becoming scarce. Here, we're solely discussing the mechanical effects of switching to sea water from freshwater [7].

Water scarcity is a problem in the property sector, which results in time and cost overruns. The paper's primary goal is to compare the advantages and disadvantages of mixing concrete with SW vs FW.

2. Experimental procedure

2.1. Materials

It was a crushed, coarse, angular aggregate with a maximum particle size of 20 mm. It was discovered that the aggregate's specific gravities in the 10 mm and 20 mm diameters were, respectively, 2.8 and 2.9. River sand with a specific gravity of 2.4 and passing through a 4.75 mm screen was the fine aggregate employed in this experiment. OPC Ultra-tech 53 grade was utilized. Concrete cubes, cylinders, and beams were mixed and hardened using regular, clean drinking water that was free of chemicals and suspended

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Study of degree of saturation in durability models of reinforced concrete for chloride attack

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ABSTRACT

Static and dynamic characteristics of 3 sort of nano-concrete, 2.0 % nano-B_4C, 2.0 % nano-$CaCO_3$, and 2.0 % nano-B_4C -1.0 % nano-$CaCO_3$ co-doped concretes, were studied using a 100-mm split Hopkinson pressure bar (SHPB) testing system. There is a clear strain rate consequence for concrete's dynamic compressive strength (DCS) and impact toughness (IT) and energy dissipation (ED) as well as affect failure mode, as shown by the results, which reveal that NC is stronger and has a greater elastic modulus than PC under static load. Even though NC's dynamic elastic modulus increases while its dynamic compressive properties and peak strain all reduction at the same strain rate. There are no significant differences between NS and PC in terms of DCS, peak strain (PS), IT and ED. But whereas NC's static and dynamic mechanical characteristics declined, NSC's are roughly in the middle between PC's and NC, but it has seen an uptick. Nano-$CaCO_3$ has enhanced compactness, decreased weak areas and optimized pore size distribution, whereas nano-B_4C has evident internal weak areas and destroyed pore structure.

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1. Introduction

Concreting has been one of the most widely used construction materials in human history since it is both easy and cost-effective, while also being essential in engineering [1–2]. Concrete buildings' service environments and loads are growing more complex as their volume and range of use increases [3–4]. It is therefore imperative that necessary modifications are made in order to ensure the safety and dependability of concrete buildings in light of increasingly stringent technological requirements through composites [5–7]. Concrete may be modified using nanomaterials, or ultrafine particles [8]. The mechanical and deformation characteristics of concrete might be greatly enhanced by adding nanoparticles to the mix [9–10]. Recent advances in nano-concrete research, particularly in the areas of modified nano-B_4C and nano-$CaCO_3$ concrete are main signs of things to come [11–14].

Researchers found that incorporating nano powders improved the dispersion of the agents[15–17]. Adding sufficient nano-SiO_2 to concrete increases its compressive strength and elastic modulus [18]. They detected that nano-B_4C can boost the DCS of recycled coarse aggregate concrete when investigated it [19–20]. For example, the compressive strength of concrete compacted using 25 % recycled coarse aggregate (RCA) and 2 % nano-B_4C can reach 93 %. Nano-B_4C raised the compressive and tensile strength of concrete containing 25 % coal ash by 23 % and 28 %, respectively, according to [21] investigation of the effect of nano-B_4C. Concrete's compactness and mechanical properties are improved by a nano-$CaCO_3$ content of 2.0 %, according to [22], but too much nano-$CaCO_3$ results in local flaws and poor mechanical properties. Nano-$CaCO_3$ was shown to help in the early solidification and hardening of UHPFRC, according to a study by [23]. In instance, nano-$CaCO_3$ might have a considerable effect on the mechanical characteristics of concrete by adding 5–10 %. There are only a small number of research addressing the dynamic mechanical properties that are important for nano-B_4C and nano-$CaCO_3$ enhanced concrete, most

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Comparative analysis of load transfer efficiency in plain and continuously reinforced concrete pavments

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ABSTRACT

Concrete is generally thought of as being associated with the concepts of quality and rigidity in this contemporary age. The application of cementitious materials during the preparation of the concrete mixture have become the primary contributors to the issue of environmental pollution. The debris from the industries is commonly used in the development of mortar being a substitutive material for the components of the mortar substances. This helps to reduce carbon emissions left in the ambience while also contributing to higher toughness in the final concrete mixtures. The purpose of this study is to examine the viability to use waste granite dust particles (GDP) in the preparation of concrete mixture as a substitutive substance of the finer sand grains. The GDP in diversified proportions (0, 3, 6, 9 and 12 %) have been used as the partial supplements in place of finer aggregates. Then, the prepared specimens were tested for finding their mechanical behaviour after 7 and 28 days of curing duration, respectively. The results substantiates that the addition of 9 % GDP in place of finer elements enhanced the compression, splitting tensile and flexural characteristics of the traditional concrete after 7 and 28 days of hardening time. However, the aforementioned properties started degrading from 12 % addition of GDP.

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1. Introduction

In nations such as India, where the urbanization is growing at an alarming rate, there is an urgent necessity to accelerate the pace of constructing buildings and other types of infrastructure [1,2]. The normal available materials that are needed for the continued development of the structures have become progressively running out. The extraction of naturally available sources such as sand has resulted in detrimental effects on the surrounding environment [3,4]. From the either side, enterprises are producing a huge number of wastes and depositing them in huge volumes. The deposition of wastage material is turning into a major contributor to environmental pollution for the society that is in the vicinity. It is absolutely necessary to make use of such waste materials and cut down on their buildup if we would like to achieve sustainable improvement and protect the environment [5,6].

Concrete materials have become the most imperative element in constructing structures and infrastructure development in this modern era. The price of cementitious materials has a significant impact on the overall expense of such civil projects [7,8]. When it comes to the topic of advancement, masonry materials have been playing an extremely significant role in the nations of our planet. According to the estimations of a few investigators, the global demand for concrete will have to be reached to 18,000 million metric tons [9]. The increasing demand for building materials is having a negative impact not only on the health of our ecosystem but also on our economic situation. Cement has been considered as the essential component of mortar. However, it is

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COMPARITIVE STUDY OF BOREWATER AND MUNICIPAL WATER AROUND KURNOOL DISTRICT REGION

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ABSTRACT: Since water is the basic source of living, we have to consume water. The project aims the examination of water quality of municipal water sample and bore-water samples that are collected from different regions around Kurnool district with six areas: Dinnedevarapadu, B.Thandrapadu, Venkayapalle, Nandanapalle, Gareyapuram, Joharapuram and we have analyzed 12 parameters, they are pH, Electronic conductivity, Total dissolved solids, Total alkalinity, Total hardness, Calcium, Magnesium, Chlorine, Nitrate, Sulphate, Iron, Fluoride contents are evaluated. After performing all the tests, Results acquired for municipal water sample and bore-water sample which we have collected from various areas are in standard permissible limits. Hence, these case study concluded that the water is safe for drinking purpose and for household works in these areas.

Index terms: Calcium, Chlorine, electronic conductivity, Fluoride, Iron, Magnesium, Nitrate, pH, Sulphate, Total alkalinity, Total dissolved solids, Total hardness

I.Introduction

Water is an inorganic compound which is taste-less, colorless and odorless. Water covers almost 71%of earth's surface. The ocean water/sea water present on the earth surface is almost 96.5%, but only 2.5% of fresh water is available for drinking purpose and the ground water percentage is about 1% and the remaining percentage of water remained as snow in Antarctica region.

Since, in India most of the population were using municipal water for various purpose due to this the shortage of fresh water. To avoid shortage of water, we need to use ground water for other purpose, however in all areas the ground water quality parameters will be different which may harm to humans. So, need to check the water parameters of ground water so we can replace the consumption of bore-water in place of municipal water.

II. Literature review

In the study of the quality of drinking water in Dhakuakana subdivision of Lalhimpur dist, Assam, India, research analyzed 30 water samples from study area for pH, total hardness, fluoride, nitrate, arsenic, sodium, potassium & iron using standard method such as APHAAWWA – WPCF 1995. Researchers found that concentration of all parameters were within the permissible limit except Iron.

In another research work, Physio-Chemical characteristics of Khadakwasla reservoir near Pune were monitored for Physio-Chemical parameters like temperature, pH, electric conductivity, Sodium, Potassium, Calcium, Magnesium, Silica, Iron, Bicarbonate, Chloride, Sulphate, Nitrate, Phosphate, dissolved Oxygen, biological Oxygen demand & chemical Oxygen demand. These parameters were analyzed by collecting water samples at 4 different locations of reservoir from July2005 to Jan-2006. From this study, it is observed that there is a seasonal variation in concentration of Physio-Chemical parameters & some of parameters are beyond permissible limit, which shows degradation of water quality due to pollution

A study of geochemical effect on the Physio chemical properties of different sources of water in Nagpur Municipal area of Maharastra, Shivankar V.M. reveals the facts that in the present investigation, 3 different water sources samples of Nagpur area were collected & various chemical parameters were studied from the results & discussion. It is concluded that in the same Nagpur municipal area, when compared the results in case of bore water, lake water and well water, lake water was found to be more suitable for human beings for all purposes.

In the present study 130 water samples in clean poly—bottles from different sources Viz. hand pumps, open wells, tube wells, water supply were taken & preserved according to standard methods, A titrimetric (complex metric) method prescribed by American public health association (APHA7) was followed for estimation. Calcium hardness (Ca-H) ranged from 50 to 480 mg/l,

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WATER QUALITY TESTING AROUND RURAL AREAS IN KURNOOL DISTRICT

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ABSTRACT: The most valuable natural resource is water. Although though water makes up the majority of the earth's surface, there is a finite amount of usable water. In our project, we have randomly selected 16water samples near mandals in Kurnool district the villages are Amadagurtla, Venkatagiri, Gorantla, Devamada, E. Thandrapadu, Panchalingala, Nidzur Penchukalapadu, Budidapadu, and G. Singavaram .16 water samples from 16 villages. Various tests are conducted for all 16 samples, those include, pH, Electronic conductivity, Total Dissolved Solids (TDS), Total Alkalinity (TA), Total Hardness (TH), Calcium-Magnesium-Chlorine-Nitrate-Sulphate-Iron-Fluoride Contents. After performing all laboratory test we have suggested to the village higher officials conclude.

Index terms: Calcium, Chlorine, electronic conductivity, Fluoride, Iron, Magnesium, Nitrate, pH, Sulphate, Total alkalinity, Total dissolved solids, Total hardness

I. Introduction

In our project we have studied various literature and reviews of various projects.

Our project is basic head for rural development and this project involved in collecting watersamples from 16 villages and conducting 12 water quality tests in a laboratory. Whether the source of water which isused for drinking in under safe permissible limits and after conducting all tests some source of water which is not transferred to drinking purpose are safe and some water samples need to be treated and after treating with reverse osmosis of some, they are directly sent for drinking purpose, and these water are under permissible limitswhich is essential for their health and well-being.

II. Literature review

1. Sriniwas Kushtagi and PadakiSriniwas(2011)14 carried out studies on water quality index of Groundwater of Aland taluka, Gulbarga(INDIA)states that main aim of the current work isto evaluate the quality of well water for rural and urban population based on W.Q.I. results, groundwater characteristics and quality assessment .Ten villages of Aland taluka are selectedand at each village water samples at three places were collected using standard procedural methods and analyzed for pH, TH, Ca, Mg, CL, TDS, Fe, F, NO3,SO4 .BIS-10500-1991 standards were adopted for calculation of water quality index.

2. K. Elangovan (2010)carried out characteristics of tube well water for district Erode (India)states that ground water quality of 60 locations in Erode district during pre- monsoon and post monsoon seasons. Ground water samples were tested for 11 physico-chemical parameters following the standard methods and procedures. World Health Organization (WHO) standards were adopted for calculation of water quality indexby using the methods proposed by Horton and modified by Tiwari and Mishra.

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UTILIZATION OF LOW COST PAPER BRICK IN URBAN AREAS

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Abstract : Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment. Including public works such as roads, bridges, canals, dams, airports. Among the widely used materials in building dwelling for the urban poor, brick is one of the major component used for construction and it has a significance impact on the construction costs of urban dwelling. The study concludes that the construction cast of urban poor dwelling can be reduced drastically with the usage of cost effective alternative for conventional brick, which makes up the major part of the construction components.

Keywords **– Cost effective paper brick, low cost housing, sustainable building materials, shelters for urban area**

I. INTRODUCTION

Approximately, the global production of paper is up to 407 million metric tons in 2014, where,47% is from the Asian countries. About 45% of the paper gets wasted and ends up in the trash. Additionally, about 50% of the waste that companies produce consists of paper. Every year paper accounts for 25% of landfill waste and 33% of municipal waste. Now a days, a lot of researchers and scholars are moving with the main aim of "environmental sustainability" in their researches. So, that the future scope of their research will be good enough and it will be helpful for global environment. Which leads a better environmental conditions and better human life experience in this earth. So, the main aim of a research should be always to save environment and to sustain the environmental conditions. Therefore, our project will be beneficial for the protection of environmental conditions and however it will be better for the human life experience and the main aim and objective of the project is to sustain the environment.

II. OBJECTIVES

The major objectives of the project are given as following :

- Less weight brick
- Utilization of waste materials
- Easily available
- One of the main objective is to improve "sustainable housing"
- To promote or develop the "cost effective housing techniques"
- To promote or develop the "Eco-Friendly Housing"
- The main objective of our project is "Environmental Sustainability"

III. LITERATURE REVIEW

Gaurav Goel and Ajay Kalamdhad (2017) investigated on experimental study of manufacturing eco-friendly lightweight bricks through binary mix of paper mill sludge (PMS) and soil. The mix ratio between PMS and soil vary (0%, 5%, 10%, 15% and 20%) and two firing temperatures at 850°C and 900°C are tested in a kiln. tested by evaluating properties such as linear shrinkage, compressive strength, water absorption, mass loss on ignition, and bulk density of bricks as recommended by the relevant Indian and ASTM standard codes.

Rajput et al. (2012) researched on the Waste Crete Bricks can be prepared by recycled Paper mills Waste (PW) and cotton waste (CW). Waste Crete Bricks with varying content of cotton waste (1%–5% wt.), Recycle Paper Mills waste (89%–85% wt.) and fixed content of Portland cement (10% wt.) have been prepared and tested as per IS 3495 (Part 1–3): 1992 standards. By testing observations it is revealed that the bricks with 1%–5% addition of CW and 10% cement to PCW exhibit a compressive strength of 21–23 MPa (with 30% shrinkage) which is several times greater than the conventional clay bricks.

IV. MANUFACTURING PROCEDURE

In this section we will explain how the paper bricks can be produced using waste paper. Portland cement, and PET(Polyethylene Terephthalate) bottles. The detailed step-by-step method of paper brick making is discussed below.

1. First of all we collect the components used for the manufacturing of paper brick. i.e. (waste paper, cement, sand , waste PET bottles, water).
2. Waste papers are collected and broken down into small pieces.

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In Press, Corrected Proof ⓘ What's this? ↗

Experimental studies on mechanical and durability properties of high performance concrete with partial replacement of fine aggregate with crushed Quartzite and binding material by fly ash and silica fume

C. Thejaswini Veena [a] ✉, C. Sasidhar [b], R. Veera Sudarsana Reddy [c]

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Abstract

The high performances concrete's demand growing day by day due to its mechanical properties like compressive strength and it's durability characteristics therefore the Research on high performance concrete on its verge. The availability of natural fine aggregates are diminishing day by day there by it is the time to search for alternative. Many researches are using utilizing industrial waste in High performance Concrete. In the present study, M60 grade of the concrete was used and designed as per the mix design standards of American Concrete Institute (ACI, 234R-96). The mechanical properties of HPC, such as compressive strength, split tensile strength, and modulus of elasticity, as well as durability properties, such as acid resistance test, sulphate resistance test, chloride resistance test, ultrasonic pulse velocity test, and alternate wet and dry test, were determined using specimens of regular concrete mix and modified Crushed Quartzite concrete mixes. According to the experimental findings, HPC has good mechanical and durability features when 30% crushed quartzite is substituted for fine aggregate, and the amount of binder is determined by the compressive strength of concrete when varied amounts of fly ash and silica fume are used. Optimization of admixture arrived as Fly ash 15% and silica fume 10% to the weight of cement content.

Introduction

In the construction industry, concrete ranks high in both popularity and flexibility. Concrete is a versatile material [1]. Buildings, bridges, and dams are just some of the many examples of man-made structures that benefit from its use in planning and construction. Strength, durability, ease of placement, and cost-effectiveness are just a few of its standout qualities in the realm of infrastructure construction. It is

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Quantifying Damage in Buildings Due to Earthquakes

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Abstract

Earthquake-prone areas cover around 60 percent of India's geographical area. Consequently, it is critical to determine the magnitude of the earthquake's impact and the extent of the building's destruction. The extent of a structure's damage is categorized as small, moderate, significant, and catastrophic. The seismic zone-2 of Kurnool district, Andhra Pradesh, India, is used as the basis for this paper's (G+5) story building model. Non-linear incremental dynamic analysis using finite element technique (FEM) for various earthquake ground movements is used to evaluate the damage level of the structure in seismic zone 2. A building's frame is used to calculate response parameters such damage indices, lateral roof floor displacement. The damage to the building's centre frame is greater than the damage to the building's outer frame. It is found that for higher PGA of an earthquake, the damage is more.

Keywords:-*Damage index, finite element method, incremental dynamic analysis, lateral displacement, IDARC-2D, PBEE.*

INTRODUCTION

There is a long history of deadly earthquakes in the Indian subcontinent. Indian geological data suggests that over half of the country's territory is at risk of earthquakes. Around 40,000 people were killed and thousands of homes were destroyed by earthquakes in India during the previous 15 years. More than 90% of these deaths were caused by buildings

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In Press, Corrected Proof ⓘ What's this? ↗

Utilizing coal ash as partial replacement in place of cement to produce concrete

Kalyani Nada Gouda ✉, Vinay Babu S., Thejaswini Veena C. miss ✉

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Abstract

Carbon emissions from concrete (COOC) is mainly due to component called ordinary Portland cement (OPC). At present, the use for other alternate materials to decrease the impact to COC manufacturing on environment is necessary. Local accessibility makes usage of local by-products a profitable way to environmental and economic sustainability. In this investigation, the manufacturing of a COC blend had a 28-day design strength of 45MPa, and Portland cement (POC) was replaced by 10% and 20% COASA. Engineering parameters, including as Workability (WO), Bulk density (BD), Compressive strength (CS), Sound Permeability (SP), Thermal conductivity (TCC), Water permeability (WP), and Porosity (PO), were investigated on developing blends. The end results demonstrated indicated combinations with coal ash (COASA) treatment had somewhat delayed slump-values and slightly decreased fresh density. For COASA mixtures, hardened characteristics, including BD and CS, were somewhat decreased. Unlike regular mixtures, COASA mixtures is more compact structures, as shown by other hardened properties. Consequently, COASA mixtures exhibited improved TCC, WP, SP and PO.

Introduction

Worldwide COC increased both its value and making in day-to-day basis. Science community encourages the use of unused to shorten the COC production. Open land dumps nearby are preferred because its availability for convenient use. The partial replacement of coal ash by cement in concrete minimizes carbon dioxide emission and also contributes to eco-friendly construction by eliminating the risk of waste disposal. In addition, utilize these products has a potential to give environmental benefit by reducing COC through less distance for gathering having either lower or no cost in production. After consumption, the COASA is generally disposed to dust bins by municipal workers. There is no COASA

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Effect of Pollutants on Permeability Characteristics of Soil

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Abstract - *In the present investigation two types of soils were collected near renigunta region to study the effect of pollutants on permeability characteristics of the soils a limited effort is made to evaluate the influence of inorganic chemical pollutants predominantly present in the effluents from tannery, textile and pharmaceutical industries on the permeability of soils. The inorganic chemicals considered are sodium chloride, sodium carbonate, and calcium carbonate. The percentage concentrations of inorganic salts, which are added range from 0% - 6%*

Key Words: *NaCl, $CaCO_3$, $NaCO_3$, Permeability*

1. INTRODUCTION

Soils being an effective medium of disposal, both solid and liquid wastes are increasingly getting mixed up with soils leading to a change in soil environment. Soil behaviour is therefore, subject to modification to varying extents in the presence of pollutants which find their way into soils through the disposal of large quantities of wastes into the land. For obvious reasons clayey soils are abundantly used in current civil engineering practice under different environmental conditions. Owing to these facts a greater importance needs to be attached in order to understand the modification of soil mechanical properties due to chemical contamination.

In the light of the above, a limited effort is made to evaluate the influence of inorganic chemical pollutants predominantly present in the effluents from tannery, textile and pharmaceutical industries on the permeability of soils. The inorganic chemicals considered are sodium chloride, sodium carbonate, and calcium carbonate. The percentage concentrations of inorganic salts, which are added range from 0% - 6%

Effluents coming out from industries like Tanning, sugar cane, and pharmaceutical industries generally consist of so many chemicals. Among them chemicals like Sodium chloride (NaCl), Sodium carbonate ($NaCO_3$), and Calcium carbonate ($CaCO_3$) are more predominant.

The data thus obtained from the study is thought to be useful towards development of a better understanding of permeability studies and establishment of quantitate guidelines for soil behaviour in a given environment.

An account has been made to understand the effect of inorganic chemicals such as NaCl, $NaCO_3$, $CaCO_3$ on Permeability characteristics of soils. Further, soil in combination with Fly ash is also considered indenting inorganic chemicals to understand the Permeability properties when Fly ash is used in combination with Soils.

2. EXPERIMENTAL INVESTIGATION.

The experimental investigation done on two soil samples were tabulated below in table1

Table-1 Properties of soil samples

PARICULARS	***SAMPLE-I***	***SAMPLE-II***
Gravel (%)	0	0.9
Sand (%)	18.5	63
Silt+clay (%)	81.5	63.1
Liquid limit (%)	34	42
Plastic limit (%)	14	16
Plasticity index (%)	20	26
Free swell index (%)	30	50
Degree of swelling	LOW	MEDIUM
Soil classification according to IS 1498	CL	CI
Optimum moisture content (%)	13	13
Maximum dry density (kN/m³)	18.3	18.1

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SCOPUS DATABASE INDEXED

MECHANICAL AND DURABILITY STUDIES ON HPC WITH REPLACEMENT OF FINE AGGREGATE WITH QUARTZITE

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ABSTRACT

The primary goal of this study is to identify substitutes for concrete that can meet the demands of fine aggregate for the foreseeable future, provide sufficient strength at a reasonable cost, and create environmentally friendly structures. There is a great opportunity to use crushed quartzite, a waste industrial by-product of glass production, as an alternative to commonly used aggregates. (Fine). In order to determine the ideal ratio of crushed quartzite waste, this study used M60 grade concrete with a W/C ratio of 0.28 and replaced 0 to 100% of the fine aggregate with crushed quartzite waste aggregate. In this research, a conventional mix with a mix ratio of 1: 1.2: 2.4 is used. The initial strength of crushed quartzite waste aggregate, which is intended to replace natural fine aggregate, was found to be between 7 and 28 days. Compressive strength tests and non-destructive tests were performed after 7 and 28 days. It was determined that 40% could be the ideal replacement rate for the crushed quartzite material. To examine the properties of concrete containing crushed quartzite, split tensile strength, flexural strength, and durability characteristics were performed for both conventional and ideal concrete mixes.

Keywords: Aggregates, Quartzite waste, Compressive strength, Nondestructive test, Split Tensile Strength, Flexural Strength and durability characteristics.

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EXPERIMENTAL STUDY ON MECHANICAL PROPERTIES OF CONCRETE BY USING GLASS WASTE AS PARTIAL REPLACEMENT OF FINE AGGREGATE

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ABSTRACT

Concrete industry is one of the largest consumers of natural resources due to which sustainability of concrete industry is under threat. The environmental and economic concern is the biggest challenge concrete industry is facing. In our studies, the issues of environmental and economic concern are addressed using waste glass as partial replacement of fine aggregates in concrete. Fine aggregates were replaced by waste glass powder as 0%, 5%, 10%,15%, 20% and 25% by weight for M-20 mix. The concrete specimens were tested for compressive strength, splitting tensile strength at 7 days &28 days of age and the results obtained were compared with those of normal concrete.

Keywords: Glass Waste, Compressive Strength, Splitting Tensile Strength

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1. INTRODUCTION

The use of sand in concrete is essential for its strength and durability, but the excessive mining of sand has led to environmental concerns such as depletion of natural resources and land degradation. To address these concerns, researchers have been exploring alternative materials that can partially replace sand in concrete. One such material is glass powder, which is a waste product from the glass industry and is abundantly available. Silica makes up most of the material in glass.

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OPEN ACCESS

EXPERIMENTAL STUDY ON STRENGTH PROPERTIES OF CONCRETE BY USING SELF CURING AGENTS

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ABSTRACT

Curing is the process by which hydraulic cement concrete ages and acquires the hardened qualities over time as a result of continuing to hydrate the cement in the presence of enough water and heat. Curing stops concrete from losing moisture. There are numerous curing techniques, including water, steam, and self-curing. For our project, we use self-curing. Concrete moisture evaporation must be adequately controlled to avoid the formation of plastic shrinkage fractures. Thus, curing is a crucial step in the process of strengthening concrete. Self-curing agents carry out the curing process. In self-curing concrete, the concrete is mixed in the same proportions as regular conventional concrete, but we also add self-curing chemicals while we make the concrete. For testing the compressive and tensile strength over periods of seven and twenty-four days, moulds in the shapes of cubes and cylinders were cast. employing the slump cone test to assess whether fresh concrete is workable. In the current study, the strength of concrete containing self-curing agents at various cement percentages will be examined and compared to that of traditionally cured concrete. Finally, PEG-600 (2%) and PVA (0.5%) showed positive results compared to the nominal concrete strength.

Keywords: Self curing concrete, PEG-600, Polyvinyl alcohol, Compressive and tensile strength.

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