

## ANALYSIS OF USE OF SUGARCANE BAGASSE ASH FOR THE PRODUCTION OF GEO POLYMER CONCRETE

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### ABSTRACT

Geo chemical compound may be a amalgam of waste product with base-forming answer to create helpful product. A geo chemical compound Concrete is characterised by its eco-friendly nature. This paper is meant to know the utilization of pilp ash in Geo chemical compound Concrete. Bagasse ash could be a by-product from sugarcane business , that is wide obtainable within the world. Moreover, the utilization of pulp ash is additional environmental friendly that reduces the ultimate value of Geo compound Concrete. pulp ash could be a wealthy in salt and aluminum oxide, thus react with base-forming answer to provide aluminosilicate gel which can bind the fine and coarse combination in an exceeding appropriate manner, that conjointly give smart resistance against adverse conditions. An attempt has been created to ascertain the likelihood of use of pulp ash in Geo compound Concrete by investigation compressive strength of M25 grade plain concrete and flexural behavior of RC member or twenty five and thirty % replacement by pulp ash.

**Keyword:** pulp ash, Geo compound Concrete, alcalescent answer, Air curing.

### I. INTRODUCTION

The cement is one in every of the extensively exploitation material in construction trade. With infrastructure development growing and housing sector booming, the demand for cement is also sure to increase. However, the cement trade is extremely energy intensive and consumes regarding 4GJ per tonne of energy. once thermal power plants and iron and steel sector, the Indian cement trade is third largest user of coal within the country. Production of 1 metric weight unit of cement requires regarding 2 tonnes of raw materials (shale and limestone) and releases zero.87 tonnes ( $\approx 1$  tonne) of dioxide, 3 kilo of pollutant, associate degree air stuff that contributes ground level smogginess and zero.4 kilo of PM10 (particulate matter of size ten  $\mu\text{m}$ ), associate degree air borne particulate that's harmful to the metabolic process track once inhaled. The global release of dioxide from all the sources is calculable at twenty three billion tonnes a year and also the hydraulic cement production accounts for regarding 7%of total dioxide emission. The cement trade has been creating vital progress in reducing dioxide emissions through enhancements in method technology and enhancement in method potency, however additional enhancements are restricted as a result of dioxide production is inherent to the essential process of calcinations of rock. Mining of rock has impact into land use patterns, native water regimes and close air quality and therefore remains joined of the principal reasons for the high environmental impact of trade. Dust emissions throughout cement producing have long been accepted joined of the most problems facing the trade.

The cement trade doesn't match the modern image of a property trade as a result of it uses raw materials and energy that are non-renewable; extracts its raw materials by mining and manufactures a product that cant be recycled. Through waste management, by utilizing the waste by products from thermal power plants, fertilizers unit and steel factories, energy utilized in the assembly is significantly reduced. This cuts energy bills staple value furthermore as greenhouse gas emission. within the method it will flip abundantly on the market waste into valuable merchandise, such Geo polymer concretes.

Geo chemical compound concretes (GPC) are inorganic chemical compound composites that are prospective concretes with the potential to create considerable components of associate environmentally sustainable construction by replacing/supplementing the conventional concretes. GPC have high strength, with good resistance to chloride penetration, acid attack, etc. These are commonly shaped by alkali activation of commercial alumina-silicate waste such ash and ground granulated furnace scum, and have a awfully tiny greenhouse footprint in comparison to ancient concretes.

### II. LITERATURE REVIEW

M. I. Abdul Aleem et al created an effort to seek out out associate degree optimum combine for Geo compound concrete and that they have casted concrete cubes of size a hundred and fifty x a hundred and fifty x150 metric linear unit and cured underneath steam activity for twenty-four hours. The compressive strength was found out at seven days and twenty eight days results square measure compared. The optimum combine is fly ash: fine mixture: coarse aggregate (1:1.5:3.3) with an answer (NaOH and Na<sub>2</sub>SiO<sub>3</sub>combined together)

to ash quantitative relation of zero. 35. High and early strength was obtained within the Geo compound concrete combine.

Mahadeshwaran C. K et.al studied the variation of strength for different grades of Geo compound concrete by varied the molarities of hydrated oxide. completely different molarities of NaOH (3M,5M,7M ) area unit taken to organize completely different mixes and cured within the close temperature. GPC combine formulations with compressive strength go from 15 to fifty two MPa have been developed. The specimens area unit tested for his or her compressive strength at the age of seven and twenty eight days. The compressive strength of GPC inflated with increasing concentration of NaOH. The GPC created for various combination of solfa syllable and GGBS area unit able to manufacture structural concrete of upper grade by self-curing solely Mr Noor-Ul-Amin had investigated on "Chemical activation of bagasse ash in cementitious system and its impact on strength development". The effect of industrially produced quicklime on strength development and pozzolonic reaction rates of bagasse ash/ cementitious system was investigated. Strength development of Quicklime- bagasse ash -cement system was monitored and presented here. Moreover efficiency factor is calculated for the activated system in an attempted to seek for optimum quicklime addition. This addition increases both early and latter strength of cement bagasse ash specimens. Addition of Quicklime in bagasse ash -cement system is effective, relative cheap and environmental friendly way to accelerate the degree of reaction. In this work quick lime is replacement of bagasse ash and not additionally added in the mix, the loss of active silica due to bagasse ash replacement was critical in the final performance of newly constructed activated blends. when quicklime is added separately more drastic effect is observed.

### III. MATERIAL

**Ground Granulated Blast Furnace Slag (GGBS):-** It is a by-product of the steel industries chamber{furnace} slag is outlined as "The non-metallic product consisting essentially of atomic number 20 silicates and alternative bases that's developed during a melted condition at the same time with iron in a blast furnace. The proportion of GGBS passing through forty five micro meter IS sieve was found to be ninety seven percent and specific gravity 2.7.

**Bagasse Ash(BA):** It is a by-product of sugarcane trade, it's collected and withstand withstand sieve. Its relative density found to be 0.32.

**Sodium Hydroxide(NaOH):-** Sodium hydroxide flakes utilized in this investigation is of commercial grade with ninety seven purity.

**Sodium Silicate Solution(Na<sub>2</sub>SiO<sub>3</sub>):-** Sodium silicate resolution flakes utilized in this investigation is of business grade with ninety seven purity.

**Fine mixture (FA): M-SAND:-** Manufactured sand confirms GRADE-II from sieve analysis take a look at. With relative density two.56 is fineness modulus found to be two.55 its loose density found to be 1620.kg/m<sup>3</sup> and its dry compacted density was found to be 1842 kg/m<sup>3</sup>.

**Coarse mixture (CA):-** Coarse mixture used is of 10mm down sized and its specific gravity was found to be two.77. It conjointly passed the take a look at of mixture impact worth and mixture crushing worth.

#### A. PHYSICAL ANALYSIS OF BAGASSE ASH

Mineralogical analysis of bagasse ash was carried out by EDX analysis, its results below figs.

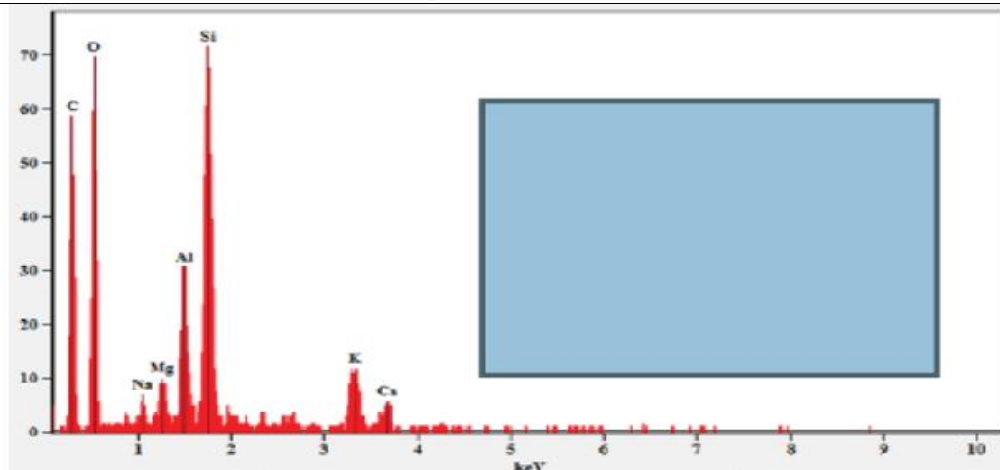


Fig EDX analysis result

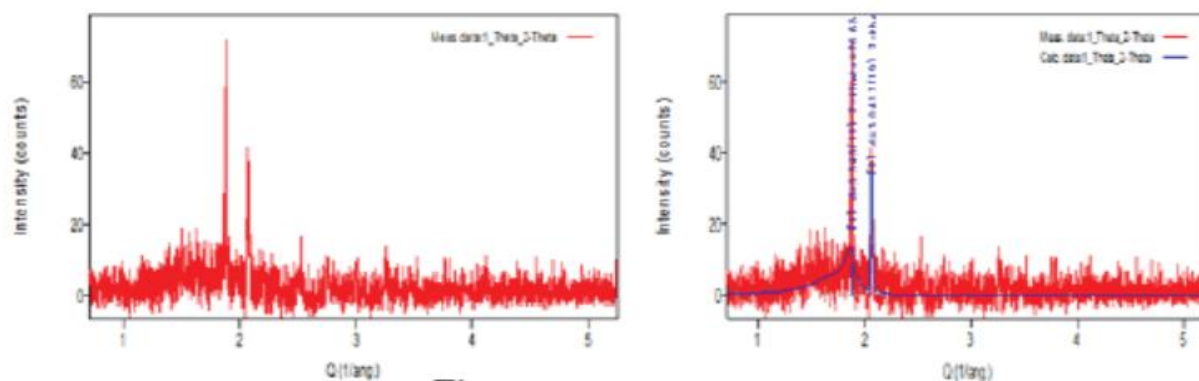


Fig XRD analysis results

#### IV. METHODOLOGY

**MIX DESIGN-** There is no specific code that governs the combination style of Geo chemical compound concrete. within the gift study, Rangan method pointers were followed to calculate the number of different constituent material needed to solid concrete specimens. amount of materials needed for M25 grade of Geo chemical compound concrete were calculated with twenty fifth and half-hour of replacement by pulp ash.

**A. Preparation of Materials-** When pulp ash brought from the business, it was passed through versed IS sieve so used for the replacement in concrete. NaOH resolution of needed molar concentration was ready. In this study 5M concentration was adopted and therefore the resolution was unbroken for twenty-four hours. Na<sub>2</sub>SiO<sub>3</sub> and NaOH solutions were mixed in appropriate proportion so as to get the gel .

**B. Batching, Mixing and Casting-** In this study, weigh batching was adopted. CA and FA were weighed to associate degree accuracy of zero.5g. On a water tight platform CA, FA, GGBS and BA were mixed completely. Then NaOH and Na<sub>2</sub>SiO<sub>3</sub> mixture was extra to the combination followed by water and continuing admixture method till obtaining a decent practicable concrete combine. when performing arts the suitable workability take a look at, the concrete combine. After performing the acceptable workability take a look at, the molds were crammed with combine and find vibrated on table vibrator. when twenty four hours re-molded the specimens and unbroken to air solidification for 28 days

**C. Compressive Strength Test-** Compressive strength is one in every of the vital property of concrete that forms a basic property for analysis and calculations . For this check, cubes of dimension 150x150x150mm were casted and cured. These cubes were tested on Compressive testing machine as per IS 516-1959. Failure load was noted. 3 cubes were checked for every test period and their average was rumoured.

**D. Flexural Strength of Rc Beam-** Flexural strength is one live of the strength of concrete. it's measured by loading a RC beam of size a hundred and fifty x150x1100mm on Universal Testing Machine as per IS 516-1959. Failure load was noted.

**E. Trial Mix of M25 Grade Geo Polymer Concrete-** The GPC combine designed employed in this study was supported Rangan methodology for M25 grade of concrete. The alkaline to binder quantitative relation is taken as a pair of.5and molar concentration of caustic soda is taken as 5M. whereas remainder of the element ar varied according to the wants of improvement methodology.

### V. EXPERIMENTAL RESULTS

#### Test Results for Compressive Strength Compressive-

**Table-1:** Compressive Strength for 7 days using Sugarcane Ash [SBA]

% Replacement By SBA	Casting I [Mpa]	Casting II [Mpa]	Casting III [Mpa]	Average [Mpa]
0%	34	35.80	30.50	33.43
5%	43.12	40.90	42.70	42.24
10%	42.56	44.66	45.00	44.07
15%	44.80	43.33	46.85	44.99
20%	42.95	40.18	40.73	41.28
25%	39.17	39.51	40.34	39.67
30%	40.55	39.41	38.15	39.37
35%	38.15	38.97	38.84	38.65

#### Test Results For Flexural Strength

**Table-2:** Flexural Strength Results at the age of 7 days using Sugarcane Ash [SBA]

% Replacement By SBA	Casting I [Mpa]	Casting II [Mpa]	Casting III [Mpa]	Average [Mpa]
0%	3.19	3.05	3.21	3.15
5%	3.22	3.27	3.25	3.29
10%	3.37	3.42	3.49	3.42
15%	3.83	4.33	4.66	4.27
20%	3.45	3.76	3.56	3.59
25%	3.33	3.44	3.30	3.35
30%	3.26	3.37	3.21	3.28
35%	3.19	3.10	3.14	3.14

### VI. CONCLUSION

- This investigation has increased the utilization of pulp ash as partial replacement for GGBS in Geo compound concrete.
- GPC with pulp ash concrete achieves concerning over 95% of compressive strength at seven days.
- This investigation additionally evident permanently flexural strength of RC beam.
- Density of this GPC combine is lesser than traditional combine and hence self-weight of the member is reduced.
- The utilization of pulp ash in concrete solves the problem of its disposal therefore keeping the surroundings free from pollution.

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