e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
Volume:02/Issue:05/May-2020 www.irjmets.com

STUDY OF CONCRETE PREPARED BY BAGASSE ASH AND DEBRIS: A REVIEW

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ABSTRACT

Today, the expanding request and shortage of development materials like concrete make the analysts everywhere throughout the world to concentrate on discovering methods for using either modern or farming waste as a wellspring of waste materials and eco-friendly substitutes or choices. As production of cement also creates an increase in CO_2 which is produced by the chemical reaction in cement. This emission can be reduced if any other material which does not contain $CaCO_3$, having pozzolanic properties is used as cement alternative. At the same time, old buildings were demolishing and new are constructed, moreover, the scarcity of aggregate is also a big upcoming problem. The demand for aggregate is increasing rapidly because of the expansion of industrialization at high rates. This problem also demands to discover the next level alternative for the coarse aggregate. Recycled aggregates can perform whole like a normal aggregate. It is important to use this waste product in construction industry to save the environment. the current paper focuses on how we can use bagasse ash and debris in concrete in order to use farming as well as modern waste which creates environmental pollution.

KEYWORDS: Bagasse ash; Debris; High strength concrete; farming waste; modern waste.

I. INTRODUCTION

Bagasse ash - As the sugar industry is one of the major industries in today's world, its residual creates pollution though it is a biodegradable waste the quantity by which it is producing creates its disposal problems. The residual of sugarcane after the extraction is known as bagasse which is around 40-45% of the sugarcane it creates the nuisance due to direct disposal so it is discarded in the form of ash which is around 8-10% of the sugarcane, in India which is the second-largest producer of sugarcane this 8% is around 10 million tons per year. Recent studies tell us that this ash contains the silica and other oxides of metal which are generally found in cement, due to is extensive pozzolanic performance SCBA is generally suggested to use this as a partial alternative of cement.

Table 1: Comparison of Physical Properties of OPC and Bagasse Ash

Properties	Ordinary Portland Cement	Sugarcane Bagasse Ash
Initial Setting Time	115	-
Final Setting Time	229	-
Specific Gravity	3.15	2.12
Fineness as surface area	370	410

Due to this chemical property of bagasse ash, it shows pozzolanic action properties when it is mixed with the cement in the concrete. Rapid industrialization makes access use of cement which makes it important to use other alternatives of cement as the possible way we can. Basic properties of sugarcane bagasse ash mix with cement help researcher to innovate various new technologies associated with sugarcane bagasse ash. A new hydrated product CSH is formed when any pozzolanic material like bagasse ash is blended with cement because of reaction of silica in pozzolanic material and lime in cement which can increase the strength of concrete mix. However, bond creation of cement with other materials in concrete discharges ozone harming substances, for the most part, CO_2 being liable for about 5% of worldwide anthropogenic CO_2 emanations.

Table 2: Comparison of Chemical Properties of OPC and Bagasse ash

Properties	**Ordinary Portland Cement**	**Sugarcane Bagasse Ash**
Silicon Dioxide (SiO_2)	21.02	70.97
Aluminium Oxide (AL_2O_3)	5.68	8.55
Ferric Oxide (Fe_20_3)	3.53	3.61
Magnesium Oxide (MgO)	1.1	2.83
Calcium Oxide (CaO)	62.25	6.50
Sulphur Tri Oxide (SO_3)	3.0	0.80
Sodium Oxide (Na_2O)	0.15	0.92
Potassium Oxide (K_2O)	0.35	1.77
Loss of Ignition	1.05	2.56

Since 1 kg of concrete creates roughly 1 kg of CO_2, the utilization of low discharge pozzolans as bond substitution is one of the potential outcomes to lessen ozone-depleting substance outflow. Despite the fact that the global warming is an issue that might be respected from a worldwide viewpoint, the utilization of pozzolans as concrete substitution is an issue that would have nearby arrangements since transport is one of the primary cost segments for cementitious materials.

Debris - On the same hand, old buildings are being demolished to construct the new tower at that place to dispose of them is also a tedious work to do some studies shows that recycled aggregates can be replaced partially or fully with coarse aggregate. The reuse of building scarps is a moderately new work for the world in spite of the current extensive amount of building waste and the noteworthy changes in the natural guidelines Applied. At the point when structures are destroyed because of debacles, their rubble contains divided structure parts, decorations and natural issue that are hard to isolate. As per the recent studies the construction waste comprises materials like metalworks, woodwork, bone-china works which can be reused in the new building construction

Table 3: Construction waste after demolition

Material	Residual
Bricks	62%
Concrete debris	24%
Small parts of bricks	6.1%
Broken Tiles	2.3%
Fixing or fixture material	0.2%
Woodworks	4.7%
Damaged steel	0.1%
Other	0.6%
Total	100%

The worldwide interest for development totals surpasses 26.8 billion tons for every year. The utilization of reused total in development can be helpful for natural assurance and conservative terms; it began since the finish of World War II by utilizing a crushed solid asphalt as reused total balancing out the base course for street development in EGYPT.

II. LITERATURE REVIEW

Mauli et.al study the behavior of high strength concrete which was prepared by using SCBA as the alternative of cement. As concrete also plays a big part in environmental pollution it is very necessary to reduce the waste by using it in concrete. In this study, the cement as replaced by SCBA with cement by weight in the ratio 5%, 10%,

15%, 20%, 25%, they got the optimum result for Compressive capacity, Flexure capacity and split tensile capacity at 10% SCBA as a partial alternative of cement.

Akash et.al prepared the concrete specimens with the replacement of sand with a ratio from 0% to 40%. This study also states that when the purity of bagasse ash is good enough it may be the potential product which is effective. the maximum replacement was found to be 10%-15% of the fine aggregates which will be economical without considerable loss in workability and strength properties. the concrete grade was M30. Bagasse ash replacement was found to be economical and can be considerably replaced with fine aggregate up to 12.5%.

Lathamaheswari et.al studied and analyse the physical and chemical properties of M20 grade concrete prepared with SCBA. the specimen was dipped in 5% Hydrochloric acid (HCL) and 5% sodium sulphate (Na_2SO_4), the result for compressive strength, flexural strength, is maximum at 10% but for weight loss, the maximum replacement was 7.5%. When the nominal concrete is compared with the concrete prepared by ash shows increased results of compression flexure and split tensile.

Sangeetha et.al study the chemical properties of bacterial bagasse ash by performing 'Rapid chloride permeability test' and 'Scanning electron microscope'. the bagasse ash used was passed from 45-micron sieve which was the normal size of ordinary Portland cement. The ratios were taken are 0%, 10%, 20% for bagasse ash and 0%, 10%, 20% for the bacteria the optimum result Compressive capacity, Flexure capacity and split tensile capacity was at 10% replacement of cement with Bagasse ash and 0% bacteria. this study shows that there is no benefit of using bacteria in concrete.The chloride permeability given by rapid chloride penetration test gives is very low for all the bagasse ash bacterial concrete specimens.

Reddy et.al study the behaviour of bagasse ash in concrete in the presence of an aggressive environment. They also used silica fumes for the good result of concrete. the silica fumes react with bagasse ash during the hydration process which also helps in increasing the chlorine-resistant and corrosion-resistant on concrete. According to author use of bagasse ash not only help to reduce pollution but also helps to reduce the cost of concrete. Two grades of concrete were prepared M30 and M40, the specimens were cured in two ways normal water and 5% of magnesium sulphate solution for the ages of 7, 28, 60 days. In all cases, the maximum ratio for replacement of bagasse ash was found to be 10% with the presence of silica fumes in it. the presence of $MGSO_4$ decreases the strength of the concrete specimen.

Kabir et.al prepared the specimen of concrete of grade M35 with full replacement of coarse aggregate by debris (recycled Aggregate). Debris is used in the forms of gravel, which are collected from two sites namely MOSQUE and Random Construction Site. The result was very much similar to the nominal specimen with more water absorption the values for ultrasonic pulse velocity test are higher than the lab tested concrete, values of rebound no in comparison with control specimen are less. The correlation values are much similar to the tensile strength is 10% more than the nominal specimen.

Asif et.al prepared two grade (M15 and M20) specimens by the replacement of coarse aggregate with recycled aggregates. The recycled aggregate was a sieve to segregate into the desired size of aggregate. The compressive results of partially or fully replaced reused aggregates are coming to be higher then the virgin aggregates replaced. This study results in more water absorption which results in more water requirement with an increase in the crushing value of the specimens.

Wagih et.al prepared the samples of concrete with replacement of coarse aggregate by scrap aggregates which are collected from 15 different sites. Aggregate used in this study is natural sand, dolomite and concrete waste from different sources in the city. This sample also contains naphthalene formaldehyde as a superplasticizer and silica fumes as a 10% replacement of cement, conclusion drawn from this is 50 % is the maximum replacement with this combination. beyond it, the strength starts decreasing.strength of 100% replacement.

Noor-ul-Amin studies the chemical properties of concrete prepared by the partial replacement of cement by bagasse ash. A rapid chloride test was done on the specimens. The study results that SCBA is an effective alternative mineral with pozzolanic properties which can replace cement up to 20%. 50% reduction Cl diffusion is done by SCBA without disturbing the other properties of hardened concrete

Ganesan et.al studies the properties of cement by preparing the specimens of mortar (1:3) and M30 grade concrete and chemical test were done the maximum replacement for the maximum result Compressive strength, Flexure

strength and split tensile strength was 10 % and chloride penetration was maximum at 15%.the specific advantages of using the bagasse ash is development of high strength at early strength and water permeability is decreased, and appreciable resistant to chloride diffusion and penetration.

III. CONCLUSION

1. Since bagasse ash is a side-effect material, its utilization as a concrete supplanting material decreases the degrees of CO_2 emission by the concrete business. Also, its utilization settles the transfer issues related to it in the sugar enterprises and hence keeping the earth free from contamination.
2. The properties of SCBA compels the enormous utilization of SCBA in cementitious materials. Calcination is one of the most significant impacting factors on SCBA organization. More consideration ought to be centred around the cogenerate plan, computation control, bagasse arid process, and so forth., to acquire attractive SCBA pozzolanic action.
3. Use of SCBA increase resistant of concrete toward sulphate attack.
4. Debris has higher bulk density by Having Fewer voids.
5. Due to attachment of cement mortar to the coarse aggregates, the rate of water absorption is much higher than new aggregates

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