International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

Green Concrete Mix Using Solid Waste as a Cow Dung and Lime- A Review

Yogesh Salunke [1,a] *,Madhuri Mangulkar[2,b]
[1]C-46/6 11th Scheme Shivajinagar, Auarangabad, Maharashtra, India
[2]Civil Engineering Dept. MIT Aurangabad Gate No -4, Beed by pass, Aurangabad, Maharashtra, India

Submitted: 01-07-2022 Revised: 10-07-2022 Accepted: 13-07-2022

ABSTRACT: Concrete which is formed from concrete wastes that are eco-friendly are called as “Green concrete”. Green Concrete may be a term given to a concrete that has had extra steps taken within the mix design and placement to insure a sustainable structure and an extended life cycle with a coffee maintenance surface. E.g. Energy saving, CO2 emissions, wastewater. Today the word green isn't just limited to colour, it represents the environment, which is surrounding us. “Green concrete” may be a revolutionary topic within the history of concrete industry. This was first invented in Denmark within the year 1998 by Dr. WG. Concrete wastes like slag, power station wastes, recycled concrete, mining and quarrying wastes, waste glass, incinerator residue, red mud, burnt clay, sawdust, combustor ash and foundry sand. The goal of the Centre for Green Concrete is to scale back the environmental impact of concrete. To enable this, new technology is developed. The technology considers all phases of a concrete construction’s life cycle, i.e. structural design, specification, manufacturing and maintenance, and it includes all aspects of performance, i.e. Mechanical properties (strength, shrinkage, creep, static behavior etc.) Fire resistance (heat transfer etc.) Workmanship (workability, strength development, curing etc.) Durability (corrosion protection, frost, new deterioration mechanisms etc.)
Thermodynamic properties (input to the opposite properties) Environmental aspects (CO2-emission, energy, recycling etc.) The process of producing of ordinary Portland cement (OPC) is energy intensive and creates various Environmental problems such as pollution and emission of CO2. There is a need for the an alternative eco- friendly Green Concrete. The waste materials from agriculture, industries, bio-waste, and marinewaste and e-waste are often recycled and used as a supplementary Green Concrete materials. This will reduce environmental impact of the production of OPC and reduces energy consumption. The application of nanotechnology for a Green building within the current and future is extremely much significant. The production and implementation of Green Concrete remains in its infancy stage. Academicians and R & D need to step in by promoting application at the industry level. The focus of this review paper is to make awareness to utilize the discarded materials also on highlight the new technology to manufacture Green Concrete.
Keywords:eco-friendly, Green concrete, nanotechnology.

I. INTRODUCTION

The economy of any country grows supported the infrastructure available. Infrastructure covers roads, bridges, buildings, warehouses, airports, harbors, container terminals etc. As the demand for infrastructure grows, so does the necessity for concrete, which leads to the demand of more cement. Cement concrete is in great demand within the housing industry and at an equivalent time it's an environmental concern, because it produces hazardous gases in various stages of production. We generally know that any concrete mix has cement, aggregates, sand, water and additives as per design need. With growing demand to control pollution and use waste materials from different industries, this is often an effort to exchange standard materials with alternative substitutes. It covers the effects on compressive strength, setting time, cost effectiveness and reduction of pollution levels. Natural resources aren't perennial, so we'd like to seek out alternatives to exchange them without compromising on the standard and effective parameters of the last word product. The cement kilns produce hazardous gases and contribute to global warming. Animals also are adversely suffering from the pollution caused by cement

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

plants. During transport of cement bags from manufacturing site to finish user, it undergoes wear and tear and cement dust flies into the environment. It causes breathing diseases and effects the labor who used to transfer, dump and redistribute the stored cement bags. Solid waste management is a major concern thanks to increase of quantity of waste materials and industrial by-products. This is increasing the land filling problems and recycling cost of waste materials. Utilization of these materials as Green Concrete is that the only choice to reduce the disposal concern.

The Green Concrete is formed from the eco-friendly waste materials and ushers during a revolution within the concrete industries by its technology. The waste products are often reused directly as a partial substitute of cement and save the energy consumption during the production of cement. Some waste materials are having pozzolans properties. Pozzolans may be a material rich in silica and alumina which itself possess little or no cementing property, but in the presence of water, it chemically reacts with lime at ordinary temperature to form the cementitious properties. The complete process of cement manufacturing, right from crushing and transport of lime stone, heating of kilns and crushing is all polluting. The river sand is employed as fine aggregate for the concrete mixes which is obtained from the river beds and erodes the valuable top soil. Since sand mining may be a lucrative business does not benefit the govt economically and disturbs the ecology of the rivers. Water flow is uneven and therefore the river bed is degraded. Coarse aggregate is gravel powdered and pounded to sizes from granite and blue stones. This also makes mining and blue metal companies to chip and blast mountains. Most of the mountains are completely chipped off which influences the rainfall pattern. Pollution and ash dust flying within the air may be a major disadvantage of blue metal quarrying. It is also powdered to manufacture Msand, a cheaper alternative to river sand. Volcanic materials and thermally processed materials can be also used as lightweight aggregates as natural resources. Water is a major commodity and usually potable grade water is best fitted to cement concrete mix manufacturing. Water is depleting and recycled water must be replaced within the system to possess a sustainable supply of water. Concrete mix causes release of greenhouse gases (CO_2) and pollutes the atmosphere. Concrete is that the most used material in housing industry and it undergoes various sorts of deterioration due to environmental effects. An enormous amount of waste materials from different surroundings, environments and industries are produced a day The waste materials like rice husk ash (RHA), saw dust ash (SDA), rubber crump, plastic waste, coconut husk and shell, textile waste (sludge and fiber) etc. cause waste disposal crisis. Recycle of such sorts of wastes are often used as an admixture to form the Green Concrete structures. This will reduce the quantity of cement used and CO_2 emission and reduce the worldwide warming.

In this paper, the reason is about the waste materials as an admixture which provides better strength and sturdiness of concrete than the existing one which not only solves the environmental and ecological problems but also significantly improves the microstructures and sturdiness properties of concrete. The demolished building waste is mixed in concrete which saves the space required to dispose them and at an equivalent time they get recycled and fresh material is not needed. This paper explains the three differing types of resources such as resources of agriculture, industries and bio-waste. By implementing nanotechnology, the properties of concrete structures can be improved.

II. MATERIAL RESOURCES

2.1 Resources from agriculture

2.1.1 Rice Husk Ash (RHA)

Rice husk ash (RHA) is an abundantly available and renewable agriculture by-product from rice milling in the rice-producing countries. It has the highest proportion of silica content among all plant residues. RHA is highlypozzolanic (siliceous materials) due to its extremely high surface area. It contains 90–95% SiO_2 which is an essential ingredient in concrete whereas OPC contains only 21% of SiO_2. The waste generated from the rice field, as RHA can be incorporated in the concrete mix (Green Concrete) to improve workability, strength, durability and decrease the cement quantity. RHA forms a calcium silicate hydrate gel (C-S-H) which can stop the cracking of the concrete and save it from any corrosion and leaching. The use of RHA in concrete showed the development of strength. In self compacting concrete, RHA solves the disposal problem, thus keeping the environment free from pollution Silica present in the RHA combines with the calcium hydroxide and forms a resistive on the material, under acidic conditions. Rameza nianpour et al. (2009) showed that concrete incorporating RHA modified concrete is having superior compressive, splitting tensile strength and modulus of elasticity is different compared with that of the controlled concrete. Alireza et al. (2010) used RHA as pozzolanic material in mortar and concrete.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

2.1.2 Saw dust ash

SDA is a further amount of wood ash generated, as a by-product of burning wood waste and it is essential to solve the problems associated with their disposal. Tarun, Rudolph and Rafat (2003) reported the subsequent elements in wood ash: carbon (5–30%), calcium (5–30%), carbon (7–33%), potassium (3%–4%), magnesium (1%–2%), phosphorus (0.3%–1.4%) and sodium (0.2%–0.5%). It also contains SiO2 and CaO that are pozzolana materials. Abdullahi (2003) has studied the behavior of wood ash/OPC concrete and qualitative analysis of wood ash, consistency, setting time and slump test of the fresh paste were determined Abdullahi (2006) has found compressive strength of the concrete was increased with the 20% replacement of wood ash at 60 days. Wood waste ash is a suitable material to supply structural grade concrete with improved strength and sturdiness. Raheem et al. (2012) used SDA substitution as a pozzolan within the production of concrete which is combined SiO2, Al2O3 and Fe2O3. This saw dust is one among the environmental threats for the society because it isn't good for human health and another organism. The use of SDA as Green Concrete will solve the disposal and environmental problem and make the sustainable concrete structures. The timber industries can look this as an alternative of waste saw dust disposal.

2.1.3 Palm oil fuel ash

POFA is an agricultural waste of vegetable oil residue from which palm fiber and shells are procured. They are burnt at 800 C–1000 C which generate the electricity thermally. It is one among the environmental threats since it's disposed as landfill materials because further utilization is not possible. It was used by many researchers as a supplementary cementitious material in mortar or concrete. POFA contains 21–22% of silica oxide which can react with calcium hydroxide (Ca(OH)2) from the hydration process and produce more calcium silicate hydrate (C-S-H) . 20% replacement of POFA could be the optimum level to achieve the strength of concrete which can reduce gradually beyond this replacement level . Vanchai Sata (2004), analyzed 10, 20, and 30% of ground POFA concretes and located that the highest strength was in 20% substitute of POFA at the age of 28 days, the compressive strength of concretes containing POFA was tested at ages of seven , 28 and 90 days. Michael Yong Jing Liu (2014) worked on utilization of vegetable oil fuel ash as binder in lightweight feather palm shell geopolymer concrete and located that blend of up to 20% POFA are often categorized as structural lightweight concrete. Ramin Andalib (2014) highlighted that in ferroconcrete beams rather than cement, utilization of vegetable oil Fuel Ash (POFA) with ash was incorporated . Addition of superplasticizer is critical to realize the workability, high filling ability, and fluidity, reduce the inter-particle friction, maintain the deformation capacity, viscosity and self-compact ability in concrete structures with enhanced compressive strength. The sustainable production of Green Concrete by POFA is possible precisely for the environment. Based on the general review it might be concluded that POFA could be used as a successful supplementary cementing material to exchange 20% of cement in concrete and mortar.

2.1.4 Coconut husk and shell

The disposal of coconut husk and shell is another environmental issue. Studies have shown that burning of agricultural wastes causes pollution and depletes the nourishment which results in decreased soil fertility [30]. Though the decomposition of agricultural waste within the field isn't harmful and it increases the productivity of the soil but its decomposition process is extremely slow. The preparation of coconut shells as aggregates is air dried within the temperature of 25–30 C and can be broken manually into small chips and sieved to urge the 12 mm size. This is used in concrete industries as partial replacement of coarse aggregates to scale back the natural consumption for the assembly of Green Concrete. The replacement of coconut shell as aggregates within the concrete mix enhanced the compressive strength compared to conventional concrete mixture. This natural coconut shell aggregates should be replaced as 10–20% in place of normal aggregate. The performance of coconut shell aggregate mixed concrete is little lower than normal aggregate concrete Vishwas P (2013) observed that 28 days cured compressive strength of coconut shell aggregates modified concrete was 24.21, 22.81 and 21.80 for 10%, 20% and 30% which provided the promising results for lightweight concrete. From the environmental and economic point of view, coconut husk and shell can be used as alternative construction material.

2.1.5 Molasses waste:

Molasses is the waste by product of sugar and paper industries, which contains lignosulphonate and acts as a dispersing reagent. They have plasticizer effect to improve the physical properties of concrete structures such as workability, durability and strength. The plasticizer

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

(admixture) is one of the important additives that are being used for designing of concrete structures and reduce the water content in the concrete mix. The molasses-containing yeast fermentation waste was used as a plasticizer in concrete mixtures and analyzed the basic principles of the effects of organic and inorganic components of yeast fermentation waste on the properties of the bonding system of concrete. Akar and Canbaz (2016) studied the addition of 0.5 and 1% of molasses decrease in water-cement rates in concrete, affected concrete durability negatively and reduced the cost of Green Concrete production.

2.2 Resources from Bio-waste material

2.2.1 Marine waste:

The shell waste may be an n outcome from the marine environment and is a great landfill problem. It is also non-biodegradable and pollutes the land and water when discarded indiscriminately. They are mechanically or manually crushed and then sieved to optimum size for the utilization as aggregates. Some articles depict that pavements using oyster shell waste cannot crack. Extreme heat or cold will not affect the pavement and thereby prevents formation of pothole. Yang et al. (2005) found that using crushed oyster shell can give better compressive strength but reduce the workability with fineness modulus decrease and substitution rate of oyster shell increase. Chou-Fu Liang and Hung-Yu Wang (2013) worked on cementing potential of pulverized shell which has calcium. After mixing with ash and soil, that mixture didn't have any pozzolanic properties, hence exhibited inferior quality.

2.2.2 Guar Gum Powder

Guar gum, also called guaran, is a galactomannan polysaccharide extracted from guar beans that has thickening and stabilizing properties useful in food, feed, and industrial applications. The guar seeds are mechanically dehusked, hydrated, milled and screened according to application. It is typically produced as a free-flowing, off-white powder. Chemically, guar gum is an exo-polysaccharide composed of the sugars galactose and mannose The backbone is a linear chain of β 1, 4-linked mannose residues to which galactose residues are 1,6-linked at every second mannose, forming short side-branches. Guar gum has the ability to withstand temperatures of 80 °C (176 °F) for five minutes.

2.1.3 Bagasse Ash:

Bagasse ash is the waste from the combustion process and is mostly disposed of as landfill. Only a small quantity of bagasse ash is utilized as pozzolan in concrete, and a considerable quantity is left unused due to its high carbon and crystallite content. In the process of making sugar, sugarcane is crushed to extract the juice. The fibrous residue is called bagasse and is used as a fuel source for feeding a boiler. Sugarcane bagasse ash (SCBA) is thus a residue obtained from the burning of bagasse in the sugar industry.

2.1.4 Cow Dung Ash:

Cow dung ash is obtained by drying cow dung under sun then burning it. Huge amount of ash generation are causing waste disposal problems. Cow dung is employed as fuel for the domestic purpose, which generates solid waste as ash. Cow dung ash is characterized by a high concentration of alkali compounds (2.57 wt% Cl, 30.6 wt% CaO, 5.56 wt% K2O) together with high phosphorus content typical for animal manure.

Table 1
Comparison of chemical constituents between cowdung ash and ordinary cement

Particulars	Cowdung Ash	Oridinary Cement
SiO_2	69.65	20.26
Al_2O_3	4.27	6.30
Fe_2O_3	2.99	3.26
CaO	12.55	65.51
MgO	2.22	0.96
SO_3	1.36	0.69
K_2O	2.94	0.88
Na2O	0.57	0.99
P_2O_5	1.48	0.25
Mn_2O_5	0.63	0.21
TiO_2	0.33	0.24

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

2.1.5 Oil palm trunk fibre

Ahmad et al. (2010) reported the potential of feather palm trunk fiber as a bio-waste resource for concrete reinforcement with improved mechanical and sturdiness properties . The oil trunk should be dried within the sunlight for 3–4 days to get rid of the moisture content and by using the crusher machine the optimum size of the fiber can be achieved. By increasing the fiber content, there was reduction in drying shrinkage also as controlling the cracking. The cement mortar mixes containing 1–4% fiber of oil palm stem showed decreased workability of cement mortar with the rise of feather palm stem fiber. The compressive strength of the concrete depends on the number of feather palm trunk fiber. An excessive quantity decreases the compressive strength and need more water hence decreases the density. It had been suggested that 2 wt% of fiber content was the optimum to offer the highest compressive strength.

2.3 Natural resources:

2.3.1 Hydraulic lime:

Hydraulic lime (HL) is a general term for calcium oxide, a variety of lime also called quicklime that sets by hydration. This contrasts with calcium hydroxide, also called slaked lime or air lime that is used to make lime mortar, the other common type of lime mortar, which sets by carbonation (re-absorbing carbon dioxide (CO_2) from the air). Hydraulic lime provides a faster initial set and higher compressive strength than air lime and hydraulic lime will set in more extreme conditions, including under water. The terms 'hydraulic lime' and 'hydrated lime' are quite similar and may be confused but are not necessarily the same material. Hydrated lime is any lime which has been slaked whether it sets through hydration, carbonation, or both. Calcium reacts in the lime kiln with the clay minerals to produce silicates that enable some of the lime to set through hydration. Any unreacted calcium is slaked to calcium hydroxide which sets through carbonation. These are sometimes called 'semi-hydraulic lime' and include the classifications feebly and moderately hydraulic lime, NHL 2 and NHL 3.5

2.3.2 Other Resources from industries:

Fly ash, Ground granulated blast furnace slag (GGBFS), Waste foundry sand (WFS), Silica fumes, Glass wool fiber, Rubber waste , Plastic waste, E waste .

2.3.3 Nanoparticles and particle packing concept for building materials:

Nanoparticles in building materials recently many articles are reported on application of nanotechnology in building materials. Nanoparticles control the matter at atomic level that deals with particle which is a smaller amount than 100 nm in size. Nanoparticles with 4 nm diameter have quite 50% of its atoms at the surface and are thus very reactive. The use of nanoparticles within the concrete structures alters the physical, mechanical and microstructure due to high area to volume ratio. Now a days, researchers are trying to find addition of engineered nanoparticles which perform as Green Concrete. The production of Green Concrete should reduce the environmental impacts during fabrication of concrete structures with enhanced life cycle. The nanoparticles within the concrete structures act as a filler and activator to market hydration process and thus develop the microstructures of concrete. Silica is naturally found in conventional concrete. Addition of nano silica within the concrete can improve the particle packing structure, reduces the permeability problems in concrete and enhanced mechanical properties. Some concrete structures are exposed to aquatic environments where calcium leaching problems occur.

Addition of Nano silica in cement can control these degradation problems by C-S-H (calcium-silicate hydrate). Nanoparticles of SiO_2 acts as a nano-filler because of formation of C–S–H gel and higher densification of the matrix improves the strength and durability of the material. The uniform distribution of nanoparticles increased the compressive strength in cement mortar. Saloma et al. (2013) presents the influence of nanosilica as a partial substitution of cement in concrete and at the age of three days, the compressive strength of concrete that contained nanosilica increased between 3.82 and 11.84%; whereas, at the age of 7 and 28 days, the compressive strength of concrete with nanosilica increased by 3.87–17.24% and 4.93–24.59% respectively. It's been also found that the modulus of elasticity and split tensile strength are likely to be increased with the rise of concrete compressive strength and recommended further the long term durability studies of nanomaterials in concrete. Titanium dioxide (TiO_2) is having hydrophilic and self-cleaning properties which have the power to interrupt down organic pollutants and Table 2 EDAX of OPC and CDA is showing weight percentage of various elements. Ingredients C O Na Mg Al Si P S K Cl Ca Ti Fe OPC 6.56 43.01 – 0.27 1.02 6.21 – 1.08 0.63 – 39.28 0.26 1.69 CDA 6.47 49.81 1.70 3.05 1.45 25.85 1.49 – 1.62 0.63 7.30 – 0.63 bacterial membranes due to powerful catalytic reactions. TiO_2 nanoparticles

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

accelerate the speed of hydration of cement and thus enhance the strength of the concrete due to its filler effects. There are several reports of TiO2 particles blended concrete having significantly higher compressive strength when compared to that of the concrete without nano-TiO2 particles. The replacement of cement with nano-TiO2 particles up to (0.5%, 1%, 1.5%, and 2%) of particle sizes of around 15–20 nm enhance the durability of the concrete. However, it had been also found that partial replacement of cement by nano-TiO2 particles decreased workability of fresh concrete; therefore, use of super plasticizer or water reducing agents or some mineral admixtures is substantial. Addition of TiO2 nanoparticles by replacing the cement in concrete structures could achieve additional antibacterial and self-cleaning properties and durability. the main application of TiO2 in building materials is due to its photocatalytic action to scale back the pollution level,self cleaning to take care of the aesthetic appearance and self disinfection properties to realize a microorganism free environment in concrete structures. The usage of nano-CaCO3 in the concrete structures acts as a filler and provides additional strength and acceleration of hydration rate. Xiaoyan Liu et al. (2012) effect of nano-CaCO3 on properties of cement paste was studied as addition of nano-CaCO3 decreased the ability to flow and the setting time was shortened. However, nano-CaCO3 had no effect on water requirement of normal consistency of cement. Adding 1% nano-CaCO3 could obviously decrease the first age shrinkage of cement paste. Some recent studies also suggested the seeding effect of the nano-CaCO3 particles and therefore the nucleation of C-S-H caused enhanced strength development. However further study is needed to confirm this. Addition of nano-CaCO3 in concrete mixture may decrease the calcium leaching problem and improve hydration time, filler with improved rate of hydration, compressive strength, better physical and chemical properties. A study on the addition of huge quantity of CaCO3 confirmed the acceleration of hydration of C3S. The accelerating effect of the finely ground CaCO3 within the hydration of cement paste was results in the precipitation of some calcium carbosilicate hydrate.

The hydration of tricalcium silicate (C3S) in presence of more than 30% CaCO3, produce some calcium carbosilicate hydrate with good mechanical performance. ZnO nanoparticles are having similar properties like TiO2 nanoparticles. It is also antibacterial, antifungal and anticorrosive. Mohammad and Saeed (2012) investigated that ZnO nanoparticles reduce the pore of concrete structures and increased the mechanical and flexural strengths. The partial replacement cement by 4% ZnO2 nanoparticles could accelerate C–S–H gel formation at beginning of hydration. It has been also found that ZnO2 nanoparticles act as nanofillers and reduce the pore structure of the specimens by decreasing harmful pores. Nazari and Riahi (2011) found that when the content of ZnO2 nanoparticles is increased up to 3 wt (%), the flexural strength of the specimens is increased which was confirmed by rapid formation of hydrated products by XRD analysis . Like other nanoparticles, 2% replacement of cement by Fe2O3 nanoparticles in concrete also showed improved strength whereas the last word strength of concrete was gained at 1.0% of cement replacement He concluded nanoparticles improves the split tensile and flexural strength of concrete but decreases its setting time. Abdoli et al. (2011) found that micro structure of cement mortar containing Fe2O3 nanoparticles showed the less pores, dense and compact structures. He also explained the increasing Fe2O3 nanoparticles up to 5% reduce the mechanical properties. The addition of 4.0% of Fe2O3 nanoparticles increased the strength and water permeability of the concrete specimens and decreased the harmful pores to enhance the water permeability and thought of as nanofillers . The formation of C-F-H gel due to addition of Fe2O3 nanoparticles can gives better filler effect with high pozzolanic action . Ali Nazari et al. (2011), limewater cured concrete with the addition of 2% of Al2O3 nanoparticles results in more strengthening gel formation, acts as nanofillers and recovered the pore structure of the specimens. Ali Nazari et al. (2010) and Agarkar and Joshi (2012) concluded that partial replacement of cement with nanophase Al2O3 particles enhances the compressive strength of concrete however declines its workability. M.R. Arefi et al. (2011) found the effect of Al2O3 nanoparticles to reinforce the mechanical also as microstructural properties of cement mortar. The addition of colloidal Al2O3 nanoparticles into the concrete structures improves its strength. Carbon nanotubes (CNT's) are cylindrical in shape with high thermal conduction. The addition of small amounts (1% wt) of CNT's can improve the mechanical properties of concrete and water. Oxidized multi-walled nanotubes (MWNT's) showed progress in compressive strength and flexural strength compared to the normal concrete.

III. MIX DESIGN WITH ADMIXTURES AND GUAR GUM POWDER

3.1.1 Conplast 430:

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

Conplast SP430 is a chloride free, superplasticising admixture based on selected sulphonated napthalene polymers. It is supplied as a brown solution which instantly disperses in water.

3.1.2 SBR Latex:
SBR LATEX is a carboxylated styrene butadiene copolymer latex admixture that is designed as an integral adhesive for cement bond coats, mortars and concrete to improve bond strength and chemical resistance.

Table 2
Mix Details of Normal Concrete with Admixtures

Constituent	**Content**
Cement	394 kg/m^3
Water	151.69 kg/m^3
Fine aggregate	573.090 kg/m^3
Coarse aggregate	1292.27 kg/m^3
Chemical admixtures	3.86
Water-cement ratio	0.38

3.2 Compression Test
The compression test was done for the cubes of size 15 x 15 x 15 cm after preparing the specimens the specimens were kept in the testing machine and slowly the load was increased until the failure of cubes. All the test are carried out after 7 days.

Table 3
Results of compression test

Particulars	**Cube No.1**	**Cube No.2**	**Cube No.3**	**Average**
Conplast 430 & SBR Latex	501.3KN 22.80 N/mm^2	546.4KN 24.28 N/mm^2	580.6KN 25.80 N/mm^2	24.29 N/mm^2
SBR Latex Guar Gum powder	806.4KN 35.84 N/mm^2	546.4KN 33.32 N/mm^2	546.4KN 28.50 N/mm^2	32.55 N/mm^2
Conplast 430 &Guar Gum powder	637 KN 28.31 N/mm^2	775 KN 34.44 N/mm^2	657. KN 29.20 N/mm^2	30.65 N/mm^2

IV. CONCLUSION

The concrete structures prepared from the waste materials have lower environmental impact through reduced CO2 emission andmaintain all the specification of ‘‘Green Concrete”. The significanceof this study is to encourage the usage of solid waste to minimizethe disposal cost of waste materials, decrease the environmentalrisk of pollution and save the landfill space. The solid waste whichare generated from agricultural, industries and bio-waste, that canreduce the usage of cement in concrete structures. It has been suggested that these waste materials as a substitute to be added inconcrete structures as admixture to get the better workability,strength and durability. The another findings of this paper is to utilize the nanoparticles to make Green Concrete and achieve the highperformance concrete by reducing the usage of natural resourcesand green house emission gas (CO2). For this inexpensive and environmental friendly building materials, the scrap merchants shouldbe educated and trained to segregate different types of waste to beused for the construction industries. Cement manufacturing industries can buy the waste materials from these vendors which theywant to incorporate and substitute in their manufacture process.The individuals can generate the revenue by selling these wastematerials for construction industries and save the global warming.

REFERENCES

[1]. Moayad N. Al-Khalaf, Hana A. Yousif, Use of rice husk ash in concrete, Int. J.Cem. Compos. Lightweight Concr. 6 (4) (1984) 241–248.

[2]. Gemma Rodríguez de Sensale, Strength development of concrete with rice husk ash, Cem. Concr. Compos. 28 (2) (2006) 158–160

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

[3]. Alireza Naji Givi, Suraya Abdul Rashid, A. Aziz, Farah Nora, MohamadAmranMohd Salleh, Contribution of rice husk ash to the properties of mortarand concrete: a review, J. Am. Sci. 6 (2010) 157–165.
[4]. V. Ramasamy, Compressive strength and durability properties of Rice HuskAsh concrete, KSCE J. Civ. Eng. 16 (1) (2012) 93–102
[5]. Vinita Vishwakarma, D. Ramachandran, N. Anbarasan, Arul Maximus Rabel,Materials studies of rice husk ash nanoparticles on the mechanical andmicrostructural properties of the concrete, Today: Proceedings 3 (2016)1999–2007.
[6]. M. Abdullahi, Characteristics of Wood ASH/OPC Concrete, Civil EngineeringDepartment, Federal University of Technology, 2003. P.M.B. 65, Minna, NigerState, Nigeria.
[7]. M. Abdullahi, Characteristics of wood ASH/OPC concrete, Leonardo Electron. J.Pract. Technol. 8 (2006) 9–16. ISSN 1583-107.
[8]. [8] Chee Ban Cheah, Mahyuddin Ramli, The implementation of wood waste ashas a partial cement replacement material in the production of structuralgrade concrete and mortar: an overview, Resour. Conserv. Recycl. 55 (7)(2011) 669–685.
[9]. M.A. Megat Johari, A.M. Zeyad, N. Muhamad Bunnori, K.S. Ariffin, Engineeringand transport properties of high-strength green concrete containing highvolume of ultrafine palm oil fuel ash, Constr. Build. Mater. 30 (3) (2012) 281–288.
[10]. C. Jaturapitakkul, K. Kiattikomol, W. Tangchirapat, T. Saeting, Evaluation ofthe sulfate resistance of concrete containing palm oil fuel ash, Constr. Build.Mater. 21 (7) (2007) 1399–1405.
[11]. M. Safiuddin, M.A. Salam, M.Z. Jumaat, Utilization of palm oil fuel ash inconcrete: a review, J. Civ. Eng. Manage. 17 (2) (2011) 234–247.
[12]. V. Sata, C. Jaturapitakkul, K. Kiattikomol, Utilization of palm oil fuel ash inhigh-strength concrete, J. Mater. Civ. Eng. 16 (6) (2004) 623–628.
[13]. Hu Zhonghua, M.P. Srinivasan, Preparation of high – surface – area activatedcarbons from coconut shell, Microporous Mesoporous Mater. 27 (1) (1999)11–18.
[14]. J.E. Ujhelyi, A.J. Ibrahim, Hot weather concreting with hydraulic, additives,Cem. Concr. Res. 21 (2–3) (1991) 345–354
[15]. Eknath P. Salokhe, D.B. Desai, Application of foundry waste sand inmanufacture of concrete, IOSR J. Mech. Civ. Eng. (2011) 43–48. ISSN: 2278-1684.
[16]. Anant Parghi, M. Shahria Alam, Physical and mechanical properties ofcementitious composites containing recycled glass powder (RGP) andstyrene butadiene rubber (SBR), Constr. Build. Mater. 104 (2016) 34–43
[17]. L.H. Chou, C.K. Lu, J.R. Chang, M.T. Lee, Use of waste rubber as concreteadditive, Waste Manag Res. 25 (1) (2007) 68–76.
[18]. Youcef Ghernouti Bahia Rabehi, Brahim Safi, Rabah Chaid, Use of recycledplastic bag waste in the concrete, J. Int. Sci. Publ. Mater. Methods Technol. 8(2014) 480–487.
[19]. Sumaiya Binte Huda, M. Shahria Alam, Mechanical behavior of threegenerations of 100% repeated recycled coarse aggregate concrete, Constr.Build. Mater. 65 (2014) 574–582.
[20]. S. Manzi, C. Mazzotti, M.C. Bignozzi, Short and long-term behavior ofstructural concrete with recycled concrete aggregate, Cem. Concr. Compos.37 (2013) 312–318.
[21]. Palash Badjatya, Radhika Bhadada, Manish Keshri, Prakash Nanthagopalan,Briefing: usage of textile dye waste water in concrete, Proc. ICE – Constr.Mater. 168 (2) (2015) 49–52.
[22]. J. Chen, C.S. Poon, Photocatalytic construction and building materials: fromfundamentals to application, Build Environ. 44 (2009) 1899–1906.
[23]. Xiaoyan Liu, Lei Chen, Aihua Liu, Xinrui Wang, Effect of nano-CaCO3 onproperties of cement paste, Energy Procedia 16 (2012) 991–996.
[24]. Mohammad Reza Arefi and Saeed Rezaei-Zarchi, Synthesis of zinc oxidenanoparticles and their effect on the compressive strength and setting timeof self-compacted concrete paste as cementitious composites, Int. J. Mol. Sci.13 (4) (2012) 4340–4350.
[25]. Ali Nazari, Shadi Riahi, Al2O3 nanoparticles in concrete and different curingmedia, Energy Build. 43 (6) (2011) 1480–1488.
[26]. Ali Nazari, Shadi Riahi, The effects of ZnO2 nanoparticles on strengthassessments and water permeability of concrete in different

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 7 July 2022, pp: 631-639 www.ijaem.net ISSN: 2395-5252

curing media,Mater. Res. 14 (2) (2011) 177–188.

[27]. Ali Nazari, Shadi Riahi, Shirin Riahi, Seyedeh Fatemeh Shamekhi, A.Khademno, Benefits of Fe2O3 nanoparticles in concrete mixing matrix, J.Am. Science 6 (4) (2010) 102–106.

[28]. Ali Khoshakhlagh, Ali Nazari, Gholamreza Khalaj, Effects of Fe2O3nanoparticles on water permeability and strength assessments of highstrength self-compacting concrete, J. Mater. Sci. Technol. 28 (1) (2012) 73–82.