Rice husk ash pdf

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Effect of Rice Husk Ash Fineness on the Properties of Concrete

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Keywords: Concrete; RHA; Fineness; Strength; Workability.

Abstract. In the present research, the effect of rice husk ash fineness on the properties of concrete was studied. Eight different fineness grades of rice husk ash were examined. A rice husk ash dosage of 15% by weight of binder was used throughout the experiments. The water-to-binder ratio was 0.49 to produce concrete having target strength of 40MPa at 28 d. Workability, compressive strength and gas permeability tests were carried out to identify the properties of concrete. The results revealed that increasing the fineness of RHA by mechanical grinding was found to improve the workability of RHA blended cement concrete. In addition, the use of RHA3 with mean particle size of 9.52μm produces the concrete with good strength. Finally, significant improvement was observed in mixtures incorporating RHA in terms of permeability coefficient.

Introduction

The utilisation of RHA as a pozzolanic material in cement and concrete provides several advantages, such as improved strength and durability [1]. The reactivity of RHA is attributed to its high content of amorphous silica and to its very large surface area, which is governed by the porous structure of the constituent particles [2]. Reactivity can be increased by increasing the fineness of the pozzolanic material. Previous studies showed that grinding of pozzolanic material, such as POFA, FA and RHA, into a high degree of fineness is the major factor affecting compressive strength of cement concrete [3]. Ramadhansyah et al. [4] also reported that at a certain stage of RHA grinding, the porous structure of the particles would collapse, resulting in reduced surface area. Grinding medium and grinding time may be conveniently adopted as RHA is highly fragile and porous [5]. In related study, Jaturapitakkul et al. [6] reported that the use of ground RHA as a cementitious material in mortars and concretes results in higher strengths with no negative effect on workability. Several papers have been published on the performance of RHA blended concrete. However, only limited information is available on the effect of RHA fineness on the concrete. The objective of the present investigation is to evaluate the influence of RHA fineness on the properties of hardened concretes.

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Utilization Of Rice Husk Ash

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ABSTRACT
India is a major rice producing country, and the husk generated during milling is mostly used as a fuel in the boilers for processing paddy, producing energy through direct combustion and / or by gasification. About 20 million tones of Rice Husk Ash (RHA) is produced annually. This RHA is a great environment threat causing damage to the land and the surrounding area in which it is dumped. Lots of ways are being thought of for disposing them by making commercial use of this RHA. RHA can be used as a replacement for concrete (15 to 25%).This paper evaluates how different contents of Rice Husk Ash added to concrete may influence its physical and mechanical properties. Sample Cubes were tested with different percentage of RHA and different w/c ratio, replacing in mass the cement. Properties like Compressive strength, Water absorption and Slump retention were evaluated.

Keywords: Rice Husk Ash, Concrete, Compressive strength, Water Absorption, Slump Retention.

INTRODUCTION

Rice milling generates a by product know as husk. This surrounds the paddy grain. During milling of paddy about 78 % of weight is received as rice, broken rice and bran .Rest 22 % of the weight of paddy is received as husk. This husk is used as fuel in the rice mills to generate steam for the parboiling process. This husk contains about 75 % organic volatile matter and the balance 25 % of the weight of this husk is converted into ash during the firing process, is known as rice husk ash (RHA). This RHA in turn contains around 85 % - 90 % amorphous silica. So for every 1000 kgs of paddy milled, about 220 kgs (22 %) of husk is produced, and when this husk is burnt in the boilers, about 55 kgs (25 %) of RHA is generated. Pozzolanas are materials containing reactive silica and/or alumina which on their own have little or no binding property but, when mixed with lime in the presence of water, will set and harden like cement. Pozzolanas are an important ingredient in the production of alternative cementing materials to Portland cement (OPC). Alternative cements provide an excellent technical option to OPC at a much lower cost and have the potential to make a significant contribution towards the provision of low-cost building materials and consequently affordable shelter. Pozzolanas can be used in combination with lime and/or OPC. When mixed with lime, pozzolanas will greatly improve the properties of lime-based mortars, concretes and renders for use in a wide range of building applications. Alternatively, they can be blended with OPC to improve the durability of concrete and its workability, and considerably reduce its cost. A wide variety of siliceous or aluminous materials may be pozzolanic, including the ash from a number of agricultural and industrial wastes. Of the agricultural wastes, rice husk has been identified as having the greatest potential as it is widely available and, on burning, produces a relatively large proportion of ash, which contains around 90% silica. About one tonne of husk is produced from five tonnes of rice paddy and it has been estimated that some 120 million tonnes of husk could be available annually on a global basis for pozzolana production. As the ash content by weight is about 20%, there are potentially 24 million tonnes of RHA available as a pozzolana. Rice is grown in large quantities in many Third World countries including China, the Indian sub-continent, South-east Asia and, in smaller quantities, in some regions of Africa and South America. Traditionally, rice husk has been considered a waste material and has generally been disposed of by dumping or burning, although some has been used as a low-grade fuel. Nevertheless, RHA has been successfully used as a pozzolana in commercial production in a number of countries including Columbia, Thailand and India.

Chemical Composition of RHA

Fe2O3	0.54
K2O	0.1 – 2.54
SiO2	62.5 – 97.6
CaO	0.1 – 1.31
MgO	0.01 – 1.96
Na2O	0.01- 1.58
P2O5	0.01 – 2.69

Feature	Application
Absorbent	For oils and chemicals [13, 14]
Insulator	• As insulation powder in steel mills • In homes and refrigerants • In the manufacture of refractory bricks
Release agent	As a release agent in the ceramics industry
Pozzolan	• Cement industry • Concrete industry
Repellents	As repellents in the form of "vinegar-tar"
Aggregates and fillers	Aggregates and fillers for concrete
Soil ameliorant	Soil ameliorant to help break up clay soils and improve soil structure
Source of silicon	Manufacture of industrial chemicals like silica, sodium silicate, zeolite and refractory material such as SiC, Si_3N_4 [4]
Substitute for micro silica / silica fumes	RHA can also replace silica fume in high strength concrete
Water purifier	To filter arsenic from water
As a vulcanizing agent	Vulcanizing agent for ethylene-propylene-dieneterpolymer (EPDM)

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Utilization of Rice Husk Ash in concrete as cement replacement

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ABSTRACT: *Rice husk ash (RHA) is an agricultural based pozzolanic material, generated by rice mills in huge quantities. This paper summarizes the experimental work of concrete in which ordinary Portland cement (OPC) cement were replaced by Rice husk ash (RHA). Partial replacement of OPC cement was carried out at 0% to 20% in steps of 5% and compared with 0% replacement. In this work different tests were performed as slump test, compaction factor, compression test and split tensile test to find the suitable percentage replacement of cement by RHA. Compression and split tests were performed for 7days and 28 days of curing and result shows some variation in both tests in every proportion. After performing tests, the results suggest that up to 15% replacement of RHA for cement is suitable for making concrete.*

Keywords- *concrete; workability; compressive strength; split tensile strength*

I. INTRODUCTION

Due to the wide use of concrete the cost of building materials increasing very quickly in some parts of the world also in developing country like India so only the industries, business cooperation, government and few individual can afford it. This rising cost can however be reduced by use of alternative building materials that are locally available and cheap. Some industrial and agricultural waste products may be use as building material. There are different wastes available in large quantities that have properties to make concrete. Rice husk is one of them; Rice husk is a byproduct of agricultural waste generated in rice mills. During milling of paddy 80% weight found out as rice and remaining 20% weight received as husk. This husk is used as fuel in industries to generate steams and other purposes. This husk contains about 75 % organic fickle matter and the remaining 25 % of the weight of this husk is converted into ash during the firing process, this ash is known as rice husk ash (RHA).

From the 20th century, there had been an increase in the economic consumption of mineral admixtures by the cement and concrete industries. The increasing demand for cement and concrete is conformed to by partial replacement of cement. Significant cost savings can result when by-products are used as a partial replacement for the energy acute Portland cement. The use of by-products also reduces the pollution and proved as an environmental friendly method of disposal of large quantities of waste materials that would otherwise pollute land, air and water.
Typically RHA contains 80 – 90% of amorphous silica, 1-2 % Potassium oxide (K_2O) and remaining being sunburn carbon. The RHA can be blended with ordinary Portland cement to produce concrete. In this present study, Ordinary Portland cement was replaced by rice husk ash at different percentage to find out the suitable percentage of rice husk ash with the help of compressive and split tensile strength.

II. APPLICATION OF RHA

RHA is a carbon neutral green product. Lots of modes are being thought of for disposing them by making commercial use of this RHA. RHA is a good pozzolanic material and can be used in a big way to make special concrete mixes. There is a growing demand for fine amorphous silica in the production of special cement and concrete mixes, high performance concrete, high strength, low permeability concrete, for use in bridges, marine environments, nuclear power plants etc.
This product can be used in a variety of applications like:

- high performance concrete
- In making green concrete
- Ceramic glaze
- Roofing shingles
- Water proofing chemicals

Rice husk ash cement. Rice husk ash concrete. Rice husk ash price per kg. Rice husk ash composition. Rice husk ash uses. Rice husk ash chemical composition. Rice husk ash concrete blocks. Rice husk ash properties.

Volume 264, 10 August 2020, 121744 rights and contentRice, as one of the most widely consumed cereals, shows regional characteristics in geographical distribution. It is largely concentrated in Asia where over 90% of the world wide rice is produced (Vigneshwari et al., 2018). There are more than 75 countries cultivate rice while China shows the biggest output. To be specific, global rice production was estimated at 736.6 million tons in 2012, China contributed 205.9 million tons, while these numbers ascended to 769.7 million tons and 214.4 million tons, respectively in 2017. As an inevitable by-product of rice industry, rice husk traditionally has a low utilization rate especially in China. The common practice of disposing this agriculture waste is to stack and/or landfill in vacant lands (Aprianti et al., 2015; Vigneshwari et al., 2018). In some cases, efforts had been made to recover energy from rice husk through combustion and gasification, with generation of heat, electricity and biogas (Pode, 2016; Yaseri et al., 2019). However, the inadequate combustion of carbon particles inside rice husk would cause the release of toxic gas. As a result, the current disposal methods for rice husk not only poses safety concern, waste of resources but also cause serious pollution to the environment (Liang et al., 2019; Pode, 2016; Yaseri et al., 2019). Therefore, utilization of this huge rice husk resource in a green and sustainable way has become one of the major environmental challenges in China.Converting wastes into construction material has become an important element in sustainable development. For instance, Waste glass powder and red mud are two typical industrial wastes that have been applied in geopolymers to improve the microstructure and strength (Hu et al., 2018; Nie et al., 2019; Xiao et al., 2020b, 2020a), Also, agricultural wastes-wheat straw ash, sugar cane ash and corn cob ash (Adesanya and Raheem, 2009; Biricik et al., 1999; Ganesan et al., 2007) are explored to enhance the performance of concrete through providing extra pozzolanic activity by amorphous SiO_2. Furthermore, rice husk ash (RHA) is another waste from agricultural sector that can potentially be recycled into value-added construction material. According to Aprianti et al. (Aprianti et al., 2015; Ataie and Riding, 2016; Mohseni et al., 2016), under satisfied conditions, combusted rice husk can react with one of the hydration products-$Ca(OH)_2$(CH) to form secondary C–S–H gel in cement matrix. Al-Ahdal (Al-Ahdal et al., 2018) indicated addition of hybrid 15% RHA and 39% fly ash led to an improvement of concrete compressive strength by 14%, triple addition of 10% RHA, 10% waste glass powder and 39% micro silica improved concrete compressive strength by 53.9%.It is presenting an attractive utilization potential for RHA to be prepared as a green mineral admixture with excellent performance. Moreover, appropriate method for RHA preparation and the deep insight of it in cement-based materials are the critical aspects in promotion the sustainable utilization of it. Therefore, the authors of this paper mainly conducted work in terms of the above questions to develop sustainable cement-based materials with RHA.Improvement of instrument technology is one of most important power for developing new construction materials (Gamil et al., 2017). In the early 1970s, Pitt (1981) had already used specialized equipment to combust organic material like rice husk for the obtainment of ash. It was one of the most primitive explorations in the preparation of siliceous material, followed by a large amount of investigations that focused on the optimization of RHA by various techniques. Fluidized bed technique is one of them that using specific fluidizing velocity, sand range (Rozainee et al., 2008), burning time (Nair et al., 2008) and temperature (Chen et al., 2015) for favorable sample to be used as pozzolanic cement additive. However, the major existing studies of combustion techniques have all shown a quite complicated combustion process as well as high combustion temperature, which may negative affect amorphous structure of SiO_2 inside RHA as well as the cementation properties of RHA (Sasui et al., 2018). A more practical technique with low combustion temperature for RHA preparation is under urgent demand.Performance improvement of cement-based materials is an important aim in utilization of RHA. Bheel (Bheel et al., 2018) proposed that the compressive strength increases up to 6% when cement is replaced by 10% RHA but decreased with more than 10% RHA. Sua-iam (Sua-iam and Makul, 2014) studied a high volume of RHA as a replacement for fine aggregate in the production of self-consolidating concrete (SCC) and found that compressive strength of SCC containing both FA (at ≤20%) and RHA (at ≤25%) exceeded 40 MPa at 180 days. Other researchers (Al-Ahdal et al., 2018; Chindaprasirt et al., 2007) also displayed positive effect of RHA in mechanical properties and durability of concrete. However, the detailed effect of RHA on durability such as sulfate resistance and the mechanism of it in microstructure development of concrete is insufficient. Moreover, cost analysis and environmental friendliness of RHA utilization are the primary concerns during the exploration of the sustainable construction materials. Only partial literature demonstrated cost reduction of cement and concrete with certain substitution of RHA, such as the demonstration that cost of cement reduces by 31.5% with 25% RHA substituting (Gastaldini et al., 2009; Khan et al., 2012), while few literature showed clearly the environmental evaluation of RHA utilization in concrete.Hence, the objective of this work was to explore the feasibility of sustainable use of RHA in cement-based materials through the following structure: (1) Preparing RHA using an efficient combustion technique with low combustion temperature which was also simple for operation. (2) Characterization of pozzolanic activity of the RHA burnt with optimized combustion parameters. (3) Exploration the application of it as sustainable mineral admixture by strength improvement of mortars and sulfate resistance for potential durability. (4) Evaluation of environmental friendliness of RHA utilization by embodied CO_2 emission and energy consumption.Fig. 1 illustrates the research methodology in sequence for this work. Firstly, the study clearly demonstrated the possibility and significance of RHA utilization, regular techniques for combustion and proposed the lack of practical combustion technique as well as related environmental evaluation. Then, designing furnace and assembling combustion system for optimum RHA acquisition. The system then undergone some calibration and experiments to better fit function. Followings were the materialsIn order to optimize the reactivity of the combusted RHA, different variables were tested first, included combustion temperature and pre-treatment duration. As shown in Fig. 7, under the same combustion condition, acid pre-treated rice husk ash (RHA-2) displayed a much light color than that of without treatment sample (RHA-5), indicating that more carbon content was removed for RHA-2. Seemingly, acid pre-treatment was a necessary step to prepare the material before moving to the burningThis work successfully demonstrated the feasibility of using rice husk ash as mineral admixture in cement-based materials in terms of mechanical performance, durability analysis, and environmental impact. This provided a promising solution for agricultural industry to recycle waste into green construction materials. The main conclusions are present as follows.(1)The highly active RHA was produced using an improved combustion technique that consisted of HCl pre-treatment and low temperatureLingling Hu: Formal analysis, Investigation, Methodology, Writing - original draft, Writing - review & editing. Zhen He: Conceptualization, Data curation, Funding acquisition, Project administration, Resources, Supervision, Validation. Shipeng Zhang: Software, Visualization, Writing - review & editing.None.This work was supported by National Program on Key Basic Research Project (973 Program) (No.2015CB655101). The authors would like to acknowledge the financial support from it.L. Zhang et al.Q. Yu et al.S. Yaseri et al.R. Xiao et al.Y. Wang et al.L. Wang et al.L. Wang et al.L. Wang et al.M. Vigneshwari et al.S.W. Tang et al.S.W. Tang et al.G. Sua-iam et al.Y. Shi et al.C. Shi et al.Y. Shao et al.I.F. Sáez del Bosque et al.M. Rozainee et al.I.G. RichardsonR.L. ReañoI. Quispe et al.R. PodeQ. Nie et al.M.L. Nehdi et al.M. Nehdi et al.D.G. Nair et al.L. Moretti et al.E. Mohseni et al.C. Ma et al.G. Liang et al.S.T. Lee et al.R.V. Krishnarao et al.R. Khan et al.G. Inan SezerW. Hu et al.P. Hou et al.P. Hou et al.J. Haufe et al.Recycling of agricultural wastes to develop low-carbon supplementary cementitious materials requires the understanding of their effects on carbon sequestration, mechanical property and microstructure characteristics of cement-based materials. This work aims to disclose the mechanism of above-mentioned behavior in porous-structured rice husk ash (RHA) blended pastes using multi-technique investigations including mercury intrusion porosimetry (MIP), 29Si magic angle spinning nuclear magnetic resonance (29Si MAS NMR), Scanning electron microscope/Energy Dispersive Spectrometer (SEM/EDS) techniques coupled with carbonation-hydration model. It was discovered that pastes with increased dosages of RHA (5%–15%) presented an increase of CO_2 uptake compared to that of control paste. It also showed an enhanced compressive strength after 12 h carbonation while simultaneously maintained a comparable strength development at 28 d. A declined permeability from water absorption experiment was also obtained especially in carbonated paste with 10% RHA. The enhanced polymerization degree of C–S–H and the decreased porosity due to the formation of calcite were the main contributors to the improved performances in RHA blended pastes.The influence of cement replacement by rice husk ash (RHA) and silica fume (SF) is explored in this study. Several microstructural and mechanical properties of the control and different binary and ternary blends of concrete with various amounts of cement, RHA and SF were determined. The binary mix with 20% RHA (RHA20) as well as a ternary mix having 33% RHA along with 7% SF (RHA33SF7) presented highest strengths which is further confirmed from their lowest water absorption and apparent porosity values. The SEM-EDS analysis revealed the formation of dense and compact microstructure in RHA20 and RHA33SF7 probably due to the calcium hydroxide (CH) and highly dense calcium silicate hydrate (C-S-H) phases. Moreover, an increase in the Brunauer-Emmett-Teller surface area along with a reduction in intruded volume, as determined by the N_2 adsorption isotherm analysis, proved the densified pore structure of these mixes. The results of the Fourier transform infrared (FTIR) spectroscopy showed a significant shift in the band from 955 to 977 cm^{-1} due to addition of RHA and SF that causes large amounts of C-S-H gels to form in these mixes. Moreover, both FTIR and thermogravimetric analysis analyses also showed significant reduction of their portlandite phase. In addition to enhanced micro-structural and mechanical performances, a relatively lower CO_2-eq (equivalent to kg CO_2) per MPa for RHA20 and RHA33SF7 indicates the significant positive impact of using higher amounts of regionally available supplementary cementitious materials in producing green concretes due to their reduced Global Warming Potential. The current findings demonstrated both RHA and SF to be used in concrete industry as a possible revenue source for developing sustainable concretes with high performance.The techniques of co-utilization of biomass and coal are of wide concern due to the benefit of CO_2 reduction. Although the co-pyrolysis process was extensively studied over the past few years, the effects of different rank coals on synergetic effect and volatile interaction mechanisms remained unclear. In this work, co-pyrolysis of rice husk (RH) and three different rank coals was comprehensively investigated to reveal the volatile release, gas product formation, changes of pore structure, pyrolysis kinetics and the synergetic effect. Co-pyrolysis of RH and coals always showed positive synergetic effect and could release more volatile species compared with individual pyrolysis. The extent of the synergetic effect in terms of volatile release and gas production was profoundly affected by different rank coals and increased remarkably as the blending changed from lignite to bituminous coal. A novel step-wise volatile release and interaction mechanism was proposed to explain the existence of synergetic effect and changes of pore structure in chars on the basis of the research results. In addition, kinetic studies showed that co-pyrolysis reactions of RH and coals were essentially controlled by chemical reaction mechanism from first to third order.The concept of using cleaner production technologies has become prominent in the present context for achieving sustainability in construction. Incorporating agricultural waste as cement replacements has shown enhanced mechanical and durability properties of the resulting mortar. A comparative study on the mechanical, thermal and environmental performance of a newly developed lightweight mortar containing agro-wastes namely Bagasse Ash (BA) and Rice Husk Ash (RHA) were investigated. Ordinary Portland Cement was partially replaced by BA at dosages of 0%, 5%, 15%, 20%, and 30% and RHA at dosages of 0%, 5%, and 15% by weight. A detailed investigation was carried out to determine the optimum material mix design which achieved good material properties. Results indicated that the addition of 30% BA as a partial replacement for cement improved the thermal performance by causing a 33% decrease in the thermal conductivity. Additions up to 30% of BA or 15% each from RHA and BA can be used to obtain mortar with compressive strengths complying with the standard values. At the same time, the combination of BA and RHA (15% each) decreased the thermal conductivity up to 31% compared to the conventional mortar. Further, the environmental assessment indicated that incorporation of BA and RHA in mortar can significantly reduce greenhouse gas emissions (i.e., 28% reduction per kg of BA).The performance of blended mortar mixtures produced with partial replacement of cement with agriculture waste ashes of rice husk, sugarcane bagasse, corncob, and waste wood were evaluated in this investigation. Cement was replaced at 5, 10, and 15 wt% with each of agriculture waste ashes for manufacturing of blended mortars. Fresh mixture properties, compressive strength, electrical resistivity, and sulfate resistance of the mixtures were evaluated at 7, 28, 56, and 90 days of curing ages and compared with that of control mixture.Test results showed a significant improvement in the later age compressive strength, electrical resistivity and sulfate resistance of blended mortar mixtures. Considerable increase in the initial and final setting times of the blended mortar mixtures was noted. Increasing demand for the superplasticizer dosage to achieve the target flow level was recorded with increase in percent replacement of cement with the agriculture waste ashes. Blended mortar mixtures produced with rice husk ash as partial replacement of cement showed superior performance among the four types of mixtures. A replacement level of 10 wt% of cement with the agriculture waste ashes was observed to be the optimum to achieve enhanced strength and durability of the blended mortar mixtures.Water pollution has increased with the growth of human population and its industrial activities. Textile effluents constitute a particular threat due to the presence of heavy metals and dyes. Adsorption is one of the most applied technologies in contaminant removal owing to its high efficiency, low cost, practical implementation and possibility to operate in several experimental conditions. However, this process implies the generation of spent materials, representing a limitation to scale-up. Although the applications of exhausted solids in effluent treatments have not been extensively reviewed before, their reutilization appears to be an environmentally and economically attainable alternative. This work summarizes the potential value of solids post-use. The open literature reports that spent adsorbents based on polysaccharides with iron oxides may adsorb up to 1 g g^{-1} of organic pollutants and up to near 100% of metallic ions from wastewater (Cu^{2+}, Cd^{2+}, Zn^{2+}, Pb^{2+}). The studied conditions vary from 30 to 60 °C, 0,05 to 6 g L^{-1} of adsorbent, 10 mg L^{-1} to 250 mg L^{-1} of organic pollutants (dyes) and pH between 2 and 8. Spent adsorbents in dye removal have proven to have near 95% efficiency in metallic ion adsorption. Otherwise, the spent solids could be applied to remove Ca^{2+} and Mg^{2+} to decrease the hardness of water. Furthermore, at the end-of-life, these materials could be used in cement and ceramic production. To achieve these aims, it is necessary to design the bioadsorbents and biocatalysts considering not only their primary uses (as adsorbent of organic pollutants), but also secondary applications (as toxic metal or hardness removal) and even their final destination (as additive in ceramic or cement production). Finally, further studies are required on the composition, properties, stability at long-term and the life-cycle cost of these materials when they are applied in the construction industry.View all citing articles on ScopusThis paper presents an experimental study on the mechanical properties of concrete added with rice husk ash (RHA) as a supplementary cementitious material. The compressive strength, modulus of elasticity and creep were obtained experimentally from specimens with different RHA contents (0%, 10%, 15% and 20% of binder). The results show that the addition of RHA in concrete can improve both the compressive strength and modulus of elasticity and reduce the creep of concrete. The examination of pore micro-structure of hardened concrete using both the mercury intrusion porosimetry and scanning electron microscope techniques demonstrates that RHA particles can react with calcium hydroxide originated from cement hydration to produce additional C-S-H, which can fill voids and large pores and thus reduces the porosity related to capillary pores and voids. In addition, the release of absorbed water, which is retained in the small pores of RHA particles at early days, can improve cement hydration and thus reduce the porosity related to gel pores.Physical, chemical and morphological characteristics of Rice Husk Ash (RHA) are discussed and the effect of rice husk combustion conditions on these characteristics is reviewed. Fresh and hardened properties of concrete and mortar containing RHA as one of the binders have been presented and the beneficial effects as well as limitations imposed by the use of this pozzolan are highlighted. The use of RHA in blended cements is shown to significantly improve durability properties of concrete. A useful list of references is provided at the end of the chapter.Rice husk ash (RHA) is a highly reactive pozzolanic material produced by the controlled burning of rice husk, and it is widely used as a mineral admixture to produce high-performance concrete. The addition of the rice husk ash has complex effects (such as the cement dilution effect, the pozzolanic reaction, and the absorption and the release of mixing water) on cement hydration. Current models do not explain all these complex effects. This paper fills this gap by presenting an analytical model to simulate the hydration of the cement–RHA blends by considering both the cement hydration and the RHA reaction. The proposed model considers the influence of factors including the water to binder ratio, the RHA replacement ratio, the absorbed water in the RHA internal pores, the fineness of RHA (that is the mean particle size of the RHA), and the amorphous SiO_2 contents, on the hydration of the cement–RHA blends. We find that compared to the plain Portland cement paste, the hydration degree of the cement in the cement–RHA blends is improved due to the dilution effect. The calcium hydroxide contents in the cement–RHA blends decrease with the increase in the RHA replacement ratio. The proposed hydration model is verified by using experimental data on the RHA blended concrete with different water-to-binder ratios and different RHA substitution ratios.To move towards sustainability, finding sustainable ways of using rice husk ash for a large rice producing country like Thailand is essential. This review seeks to find sustainability characteristics of the uses of rice husk ash from power plants. It also reviews how rice husk ash is produced from different power generation technologies. Characteristics of rice husk ash are affected by different factors such as sources, preparation methods and combustion technologies. Different forms of rice husk ash, amorphous and crystalline, suit different applications. Ash from moving grate technology is suggested for use as adsorbent while that from fluidized bed is suggested for use as filler in polymeric composites and in the synthesis of innovative ceramic compounds. The ash from suspension fired technology is suggested for use in the construction industry and zeolite production. In addition to technical viability, using rice husk ash to substitute conventional products helps gain both environmental and economic benefits. Despite claiming sustainable applications of rice husk ash, many research papers report only technical performances of the products. This paper draws out sustainability characteristics of different rice husk ash applications using the “triple bottom line” framework. Potential reduction of greenhouse gas emissions, cost saving and employment generation of rice husk ash use options have been investigated. Results from the review suggest that using the ash to replace charcoal is the most sustainable option when comparing with other alternatives such as Portland cement, commercial silica and lime. This option could help to reduce GHG up to 1005 kg CO_2eq/t product, to save cost up to 8000 THB/t product, as well as to help generate employment for about 5 person-years/M THB spent in the sector. However, to make the sustainability assessment more comprehensive, other sustainability indicators such as fossil fuel depletion, human toxicity, ecotoxicity, particulate matter formation, total net profit (TNP), total value added (TVA), and incomes of workers are also needed to be considered in future research.This research aims to utilize rice husk ash as a cementitious materials in recycled aggregate concrete (RAC). Rice husk ash was ground until the particles remained on a No. 325 sieve were 4.6%wt. Then, the ash was used to partially replace cement at 20 to 50%wt of binder to cast concrete. The compressive strength, steel corrosion, and chloride penetration depth by the impressed voltage method of RAC were examined. The results revealed that the replacement of 20% of ordinary Portland cement (OPC) by ground rice husk ash (GRHA) enhances the compressive strength of the RAC to be greater than the RAC without GRHA at 60 days. Concrete with GRHA at 20 to 50%wt of binder significantly improved the steel corrosion and chloride resistance of the RAC. The utilization of GRHA at 50% to replace OPC gave the highest chloride penetration resistance and produced the lowest steel corrosion of the RAC. Although, the RAC with GRHA had less compressive strength than CT concrete, the concrete provided a positive effect of increasing the resistance of chloride penetration and lowering steel corrosion.The production of cement depletes natural resources, consumes high energy and emits huge amounts of green house gases. It accounts for almost 7% of the global carbon dioxide emissions, as the production of one ton of ordinary Portland cement releases approximately one ton of carbon dioxide. Due to the severe environmental pollution and health hazards associated with the cement and construction industries, they are under the strict scrutiny from the governments and environmentalists.Rice husk is an agricultural waste, whose natural degradation is restricted due to the irregular abrasive surface and high siliceous composition. It is not appropriate to be used as a feed for animals due to the low nutritional values. If dumped as landfill, they can take a lot of area and become a major challenge to the environment. If they are disposed by burning, the ashes can spread to the surrounding areas, create pollution and destroy the natural beauty. One of the possible solutions for the disposal of rice husk is to convert them into rice husk ash and incorporate them into cement based materials. The partial inclusion of rice husk ash (RHA) for cement is found to be durable, environmental friendly and economically viable.This paper presents an overview of some of the published results on the successful utilization of rice husk ash as a supplementary cementitious material and the properties of such concrete at fresh and hardened stages. Studies indicate that there is a promising future for the use of rice husk ash in normal, high strength and self compacting concrete as it shows high strength, low shrinkage and permeability, high resistance to carbonation, chloride, sulfate and acidic environments. The summery and discussions provided in this paper should provide new information and knowledge on the applications of greener and sustainable rice husk ash concrete.View full text

Rice husk ash. Rice hulls (or rice husks) are the hard protecting coverings of grains of rice. In addition to protecting rice during the growing season, rice hulls can be put to use as building material, fertilizer , insulation material, or fuel. The ash produced after the husks have been burned, (abbreviated to RHA), is high in silica. Rice husk ash. Millions of tonnes of rice husk is produced every year that, when burnt, produces a pozzolanic ash that can be added to cement in place of clinker. Rice husk is the outer covering of the grain of rice. This covering is removed when paddy rice is processed, leaving a waste product that contains 15%-20% silica, as well as cellulose ... Our Rice Husk Ash is suitabe for steel and cement industry, The benefit of using RHA are follow: • Heat loss prevention. Deelert Group has been establish for over 20 years in Agriculture and Export. Deelert processes and packages Rice Husk Ash for different industries such as cement and steel industry. By using consistent and quality process ... 02/11/2015 · Rice Husk Ash 1. seminar on RICE HUSK ASH PRESENTED BY- GUIDE MOHAMAD MUJTABA HARSHA.D.SAPKAL 2. A valuable green resource with great potential 3. What is Rice husk ash (RHA) Obtained from burning protecting outer cover of rice husk It consists of non-crystalline... 4. RICE HUSK RICE HUSK ASH 5. ... Rice husk ash (RHA) fillers are derived from rice husks, which are usually regarded as agricultural waste and an environmental hazard. Rice husk, when burnt in open air outside the rice mill, yields two types of ash that can serve as fillers in plastics materials. The upper layer of the RHA mound is subjected to open burning in air and yields ... Rice milling industry generates a lot of rice husk during milling of paddy which comes from the fields. This rice husk is mostly used as a fuel in the boilers for processing of paddy. Rice husk is also used as a fuel for power generation. Rice husk ash (RHA) is about 25% by weight of rice husk when burnt in boilers. Our company is driven by the desire to deliver the best quality Rice husk Ash. AC2N Co., Ltd has emerged as a leading supplier to many of the nation’s top retailers. Our pride in this growth is surpassed by our priority to treat each customer like family. We believe in providing exceptional customer service and support that belief with an ... The rice husk ash is a green supplementary material that has applications in small to large scale. It can be used for waterproofing. It is also used as the admixture to make the concrete resistant against chemical penetration. The main applications of rice husk ash in the construction are: High-performance Concrete.

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