
Review on the Use of Waste Sludge as an Ingredient in Bricks

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ABSTRACT

With the increase in population the use of natural resources increases on daily basis. So in this case it is our prime duty to save the natural resources by replacing it with the recycling or reuse of the waste products. Objective of this literature review is to check the efficiency of the use of sludge in the bricks, to get the alternate of sludge disposing, to reduce the use of natural clay soil in the bricks. Keeping these points we have reviewed the literature which is mention below.

Keywords:

(Bricks, waste material, sludge, compressive strength)

INTRODUCTION

As the science and technology is rising day by day, it is our prime duty to save the nature. In this regard this paper is based on the use of the waste material in the bricks manufacturing. The provision of wastewater treatment is based on the characteristics of the sludge, in the former treatments it contains large number of pathogens, but in the latter on methods, it contains very less number of pathogens as the pathogens die off. Sludge is required to handle with care to avoid it from the contact with the pathogens. When the wastewater is directly poured into the sewerage system without any pre treatments then it contact with the heavy metals and other pollutants. Once the sludge is contacted with the heavy metals and other pollutants than it become very difficult to treat it. Heavy metals and other pollutants make it unsuitable for the fertilizer and land disposal.

LITERATURE REVIEW

Shrikant S Jahagirdar et.al (2013) represented a paper ‘Utilization of Textile Mill Sludge in Burnt Clay Bricks.’ In this paper they are introducing the Textile mill sludge in the manufacturing of the bricks by mixing the clay soil and textile mill sludge together. He took the sludge for bricks by mixing with the clay soil as 0% to 35% by weight. Different samples of each percentage undergone through the various tests like compressive strength test, water absorption test, efflorescence as per the procedures of Bureau of Indian Standards. After the testing, the author conclude that the dry sludge can be used in the bricks as the partial replacement for the clay in the well burnt bricks. Hence it may reduce some cost of brick also. Textile mill sludge can be used up to 15% without compromising the chemical and physical properties of the bricks as per the IS code. As the organic matter is present in the sludge, when the brick is burnt at the 5500 oC temperature, it created the voids in the bricks. Which reduces the compressive strength of the brick and it increases the water absorption capacity as well.

Anyakora Nkolika Victoria et.al (2013) represented a paper ‘characterisation and performance evaluation of water works sludge as bricks material.’ In this paper they are saying that the use of sludge in the well burnt bricks is a long term approach as point of view of the disposal, economy, and environmental sustainability. The physical, mechanical and chemical properties of the sludge was determined as per the Nigerian Standard specifications (NIS 74:1976) and British Standard Specifications (BS 3921:1985). For the evaluation of the well burnt bricks using Sludge, Five different ratios of the Sludge and clay were taken as 0%, 5%,10%, 15% & 20% by weight. Each and every mixed batch was hand 10 moulded to the standard size and shape of the brick. All the brick samples were heated in the kiln at 850oC temperature to the 1050 oC temperature. At the end of the study the author concluded that sludge-clay bricks can be used successfully without any failure.

The proportion of Sludge-clay and Temperature of firing the bricks are two main factors which affect the quality of the bricks.

Aeslina Binti et.al (2014) represented a paper ‘An Overview of Sludge Utilization into Fired Clay Brick.’ In this paper they are saying that the use of waste sludge in the bricks is showing very positive results. Use of sludge in the brick is very beneficial for the environment point of view. Sludge bricks have very good physical properties as well as the chemical properties. The fired clay bricks made up of the mixture of sludge and clay are tested for the water absorption, efflorescence, compressive strength etc and it shows very positive results. By which the bricks are acceptable for the construction of buildings and other structures. As per the author use of sludge in the bricks may be an alternative method for the disposal of waste sludge and we can prevent the natural resources upto some limits.

B.Shobha(2015) represented a paper ‘Utilization of Water Treatment Plant Sludge in the Brick Manufacturing. ‘In this paper she is saying that due to urbanization of the areas, it is very serious problem to dump the Waste sludge. We can drastically reduce the dumping problem of sludge by using it in to the manufacturing of bricks by partially replacing it with the clay soil. Before the use of sludge in to the bricks, the characteristics of sludge like PH, Aluminum, Lead, Chromium were checked. Bricks were manufactured with the sludge variation of zero to thirty percent. Use of sludge in the bricks can reduce the cost of the brick also. All the bricks manufactured with sludge were tested to check the compressive strength and water absorption. As per the author, bricks up to 30% waste water sludge can be used for the non-load bearing structures.

Mohammad Ismail et.al (2010) represented a paper ‘Fabrication of Bricks from Paper Sludge and Palm Oil Fuel Ash.’ In this paper they are saying that use of sludge in fabrication of bricks is the alternative sustainable application. This paper shows the performance results of the bricks made by the Palm Oil Fuel Ash (POFA) and paper Sludge. They made the brick samples with the various proportions of the sludge, cement and POFA to study the laboratory results like compressive strength, Water absorption and heavy metal leach ate. According to this paper the bricks sample with 20% POFA and 20% Paper Sludge have the acceptable compressive strength and water absorption value. These kind of the bricks can be used for the masonry partition wall purpose to reduce the substantial cost.

Alaa A. Shakir et.al (2013) represented a paper ‘Manufacturing of Bricks in the Past, in the Present and in the Future.’ They are trying to cover the gap between the art work of manufacturing the bricks with the past trends and current trends with point of view to the use of raw materials in the bricks industry. After the study, authors comes to know that still there is a gap between the earlier researches which are to be contemplated. As per this review paper, Billet scale, Quarry dust, Fly ash, Bio solids, Bottom ash to be utilized as the main constituents in the bricks.

Halil Murat Algin et.al (2007) represented a paper ‘Cotton and limestone powder waste as brick material’. In this paper the author is representing the use of cotton and limestone waste powder in the manufacturing of bricks. Water absorption , compressive strength and flexural strength of cubes were tested for all the samples. According to this paper,10%-40% of cotton waste in bricks as a alternate of the clay is acceptable. Replacement of Cotton waste and Lime powder waste with clay in bricks also reduces the cost of the bricks.

Rohan Rajput et.al (2016)represented a review paper ‘utilization of Bagasse ash as a brick material, A review’. In this paper the authors have investigated that use of bagasse ash in the brick can solve the problem of disposal. It can reduce the cost of the brick. Use of Bagasse ash in the brick can produce eco-friendly green bricks. According to the author by this method maximum compressive strength can be attained. Bagasse ash bricks can also reduce the seismic load of the structure.

Conclusion:

On the basis of the above literature discussed we can use the sludge collected from the different sources in to the bricks as a partial replacement of the clay soil. Various physical and mechanical properties can be

evaluated on these bricks and can be recommended for the use in the construction work. These bricks can also be further categorized as per the properties evaluation after the manufacturing.

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