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Light weight bricks using sludge

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ABSTRACT

Waste may be defined as an unwanted material generated after the manufacturing process from industry, agriculture, or from house hold activity. Waste causes many nuisances in the environment. It produces many types of infection, for human and animal. The sludge from tannery effluent plants has problem of disposal. Dewatered sludge is disposed off by land filling. However, it is not an appropriate solution, due to the land limitation. The production of sludge in tannery effluent plant is about to increase every year. In addition, the constraint to treat sludge is very high in cost and time-consuming, which is the disadvantage to the responsible parties. Therefore, thisstudy was carried out to utilize those sludge waste (SW) produced frothe tannery effluent plant as a brick. The sludgebrick (SB) mixtures were incorporated with many ratios of SW. Tests were conducted such as fineness test, specificgravity, water absorption and compressive strength. As the conclusion, brick with 20% utilization of SW is acceptable to produce good quality of brick. This study shows that the disposal of tannery sludge TSW would act as a suitable material for manufacturing of bricks with proportionate mix and design.

Keywords: Sludge, Tannery Effluent

1. INTRODUCTION

In this study, we investigated whether lightweight bricks could be made out of sewage sludge and bottom ash, as an effective recycling method. We measured the brick's compressive strength, specific gravity, and water absorption as properties that were important in determining the resulting brick's suitability for use as lightweight brick. Light weight bricks have become an important trend for green

buildings. This is because lightweight bricks reduce the building weight. The numbers of inner pores in lightweight bricks are much greater than in traditional bricks

Brick is one of the most important construction materials. Various attempts were made to incorporate various waste material in brick production such as natural fibers, foundry sand, processed waste tea, sewage sludge, waste water sludge etc. The increasing popularity of using environmental friendly, low cost building material has brought about investigating the idea of using sludge as ingredient in brick. Sludge generated at sludge treatment plant should be treated and handled in an environmentally sound manner. The old practice of discharging sludge directly into rivers violate the stream standards since it leads to the rise of aluminium concentration in waterwhich affect aquatic organisms consequently humans. Thebrick industry is the most indicated technological activity sector to absorb solid waste due to large quantity of raw materials used by the sector as well as by the large volume of final products in construction The study involves the usage of sludge, a biodegradable material its constructionand demolition waste as an essential ingredient.

II. LITERATURE REVIEW

Joo Hwa Tay has done a study on bricks manufactured from sludge. The paper presented the results of the utilization of dried sludge as brick making material. The results showed that the maximum percentages of dried sludge and sludge ash that can be mixed with clay for brick making are 40%. It was also found that bonding of mixturebeyond that is poor. G. Reddy Babul and N. Venkata Ramana have done experiments to study the durability of bricks cast with industrial sludge. This experiment result also showed that the brick can be replaced with sludge up to 40% by weight without loss in strength and other brick characteristics considered satisfactory for conventional purposes. Also found at 5% of replacement, the quality of brick is superior to the bricks made from earth alone and can be used for superior work of permanent nature. Badr El-Din Ezzat Hegazy, Hanan Ahmed Fouad and Ahmed Mohammed Hassanain experimented the incorporation of water sludge, silica fume and rice husk ash in brick making. From the results it was concluded that a mixture consists of 50% of sludge, 25% of SF, and 25% of RHA was the optimum materials proportions to produce brick from water sludge incorporated with SF and RHA.

III. MATERIAL AND TYPE OF SLUDGE

A) MATERIAL

a) DRY SLUDGE
b) SOIL
c) SAND
d) WATER
e) PLASTIC FIBERS
f) FLY ASH

B) DIFFERENT TYPES OF SLUDGE

Sludge is a semi-solid slurry and can be produced assewage sludge from wastewater treatment processes or asa settled suspension obtained from conventional drinking water treatment and numerous other industrial processes. Different types of sludge waste that can be incorporated infire clay brick are:

a. Water Treatment Sludge: In a study that was carried outby Taiwan (Chiang et al.2009). Novel lightweight bricks have been produced by sintering mixes of dried water treatment sludge and rice husk. Samples containing up to 20 wt. % rice husk have been fired using a heating schedule that allowed effective organicburn out. A mixture consists of about 10% of the watertreatment sludge was added to about 90% of natural clay to produce the brick.

b. Sewage Sludge: Anyakora Nkolika Victoria 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

c. brick is a long term approach as point of view of the disposal, economy, and environmental sustainability. Itwas found that proportion of sludgeclay and temperature of firing the bricks are two main factors which affect the quality of the bricks.

d. Textile Mill Sludge: Shrikant S Jahagirdar1, S. Shrihari2, B Manu3 1 NITK, Surathkal, India investigated f the effect of Textile mill sludge addition in burnt clay bricks. The study demonstrates that textilemill sludge can be used as partial replacement for claysin burnt clay bricks. Textile mill sludge can be used up to 15% without compromising on the compressive strength of 3.5 N/mm2 and water absorption of 20% asper the IS code requirements.

e. Other sludge: that are experimentally proven suitable tobe used as a partial replacement of brick clay are stone sludge, rubber sludge etc. The sludge used for the experimental purpose is rubber sludge collected from Latex industry; Binanipuram. The main raw material used in this industry is Latex. Latex is a colloidal suspension of very small polymer particles in water.

IV. METHODOLOGY

Methodology of the study includes:
1) The production of the Lightweight blocks
2) Building analysis

a). Traditional building analysisb). Lightweight building

Manufacturing of Brick

a) Weigh batching
b) Mixing of material
c) Casting of brick
d) Placing of brick
e) Burning of bricks

OBJECTIVES

1. To suggest alternative to conventional brick.
2. To design light weight brick.
3. To achieve strength and feasibility.
4. To examine the effect dry sludge in brick properties.
5. To utilize dry sludge as ingredients of brick forconstruction.
6. To try to reduce pollution.
7. To find if the compressive strength of bricks made usingsludge is compatible with conventional brick.

MIX DESIGN OF BRICKS: PERCENTAGE OF SLUDGE, BRICK CLAYAND WATER WAS DECIDED

Different percentage of sludge	Clay	Water
0	100	
5	95	
10	90	AS
15	85	PER
20	80	REQUIED
25	75	

V. FUTURE SCOPE OF STUDY

The percentage of Fly Ash in the manufacturing can be increased or decreased in the manufacturing of modified bricks and the changes in the properties of bricks thus manufactured can be observed

VI. CONCLUSION

The study suggests that the sludge can be effectively usedfor manufacturing of brick to required shape and size by adopting the proportions of ingredients used in the study particularly 5% , 10% and 15% sludge. Merely dumping and disposal problem of sludge will occupy more space and creates the environmental pollution with in surrounding region. So in order to prevent all the above issues, sludge can be used for manufacturing of brick as astrong material and cost effective.

VII. ACKNOWLEDGEMENT

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VIII. REFERENCES

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