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SUBSTANTIAL USE OF CIAGRETTE BUTTS FOR MANUFACTURING OF BRICK

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ABSTRACT

A large amount of cigarette butts (CBs) are produced worldwide yearly. The insufficient collection and inappropriate disposal of wastes poses risks to human health and the environment. Over the next few decades, globalization, rapid urbanization and economic growth in the world are tending to further deteriorate to this situation. These CBs accumulate in the environment due to the poor biodegradability of the cellulose acetate filters and pose a serious environmental risk. This paper presents some of the results from a continuing study on recycling CBs into Fly Ash Bricks. Properties including compressive strength, Water Absorption and efflorescence.

Keywords: Cigarette Butts, Fly Ash, Sand, Grit

I. INTRODUCTION

CB accumulates due to the poor biodegradability of the cellulose acetate filters. CB filters also releases a range of toxic chemicals as they deteriorate. CBs are carried by storm water into watercourses and ultimately the ocean where the chemicals they contain poses a risk to the organisms of both freshwater and marine environments. Land filling and incineration of CB waste are not found practicable, universally, neither environmentally sustainable nor economically feasible, nor when correctly binned and sent to landfill far from natural waterways, remains an environmental hazard. Also, land filling of CBs with high organic content and toxic substances remains environment hazards. Incineration of CBs is also an unsustainable solution as emissions from the burning waste contain lot of hazardous substances. Recycling CBs is problematic because there are no easy mechanisms or procedures to assure efficient and economical separation and recycling of the entrapped chemicals. An alternative could be to incorporate CBs in a sustainable composite building material such as bricks. Brick is one of the most popular masonry units as a building material. Attempts have been made to incorporate waste of rubber, limestone dust, wood sawdust, processed tea waste, fly ash, polystyrene and sludge in the production of bricks. Recycling of such wastes by incorporating them intobuilding materials is a practical solution to control the pollution problem. In addition, adding carbonaceous industrial is found to be an efficient and environmentally advantageous way of reducing fuel use for brick-making and to certain extent. Clay brick masonry is one of the oldest and most durable construction technique used by mankind. Masonry consists ofmanually built stable stacks of small elements, with or without mortar. It was fundamental building material in the Mesopotamian, Egyptian and Roman periods. During the Roman period, the use of clay brick increased and became popular to maximize its benefits. Clay brick masonry continued to be used during

medieval and modern times. Despite several modifications of the clay brick uses, shape and manufacturing process along with thousands of years of constant evolution, the simplicity of bricks success remained.Due to these smokers a large amount of CBs are generated which are not degradable and incinerating. These CBs flows in water bodies and cause serious problems for aquatic life such as flora and fauna and also damage the aquatic plants. In open atmosphere these CBs take a very long time to decompose. It takes approximate 1000 years to decompose; these CBs cannot be burnt fully. As stated earlier land filling and incineration of CBs is also not economical therefore this creates a severe problem to our environment. It is pinioned that CBs may prove a very good material for manufacturing of bricks.

II. MATERIAL

2.1 Fly Ash

Pulverized fuel ash commonly known as fly ash is a useful by-product from thermal power stations using pulverized coal as fuel and has considerable pozzolonic activity. This national resource has been gainfully utilized for manufacture of pulverized fuel ash-lime bricks as a supplement to common burnt clay buildings bricks leading to conservation of natural resources and improvement in environment quality. Pulverized fuel ash-lime bricks are obtained from materials consisting of pulverized fuel ash in major quantity, lime and an accelerator acting as a catalyst. Pulverized fuel ash-lime bricks are generally manufactured by intergrading blending various raw materials are then moulded into bricks and subjected to curing cycles at different temperatures and pressures. On occasion as and when required, crushed bottom fuel ash or sand is also used in the composition of the raw material. Crushed bottom fuel ash or sand is also used in the composition as a coarser material to control water absorption in the final product. Pulverized fuel ash reacts with lime in presence of moisture from a calcium hydrate which is a binder material. Thus pulverized fuel ash – lime in presence of moisture form calcium – silicate hydrate which is binder material. Thus pulverized fuel ash – lime brick is a chemically ended bricks. These bricks are suitable for use in masonry construction just like common burnt clay bricks. Production of pulverized fuel ash-lime bricks has already started in the country and it is expected that this standard would encourage production and use on mass scale. This stand lays down the essential requirements of pulverized fuel ash bricks so as to achieve uniformity in the manufacture of such bricks.

a) **CIAGRETTE BUTTS:** Worldwide, cigarette butts (CBs) are the most common type of litter. The United States Department of Agriculture estimates that in 2004 over 5.5 trillion cigarettes were produced in the world. This is equivalent to an estimated 1.2 million tonnes of cigarette butt waste per year. These figures are expected to increase by more than 50% by 2025, mainly due to an increase in world population. CB's accumulate in the environment mainly due to the poor biodegradability of the cellulose acetate filters. CB filters release a range of toxic chemicals as they deteriorate. CBs are carried by storm water into watercourses and ultimately the ocean where the chemicals they contain pose a risk to the organisms of both freshwater and marine environments.The filter of cigarette contains a sponge like material which is not decomposed and therefore they can be utilized in manufacturing of bricks. We can test various properties of bricks including CBs. Land filling and incineration of CB waste are not, universally,

neitherenvironmentally sustainable nor economically feasible disposal methods. Even when correctly binned and sent to landfill far from natural waterways, CBs remain an environmental hazard. Also, landfilling of waste with high organic content and toxic substances is in general becoming increasingly costly anddifficult. Incinerationof CBs is also a seemingly unsustainable solution as emissions from the burning waste contain various hazardous substances. The butts are collected from dry receptacles. Upon delivery, the CBs are disinfected at 105 Degree Celsius for 24 hours and then stored in sealed plastic bags.

Photo No.1 Shows Preparation of Fly Ash and Cigarette Butts Brick

III. PROCEDUR

The process of making brick generally consists the following steps: Gathering, crushing, grinding, screening, and mixing the raw materials; making the brick; and setting, drying, packaging and inventing the final product. The mixing of raw material with cigarette butts for manufacturing of bricks is same as conventional method and then drying it in sun rays. Then the bricks are ready for transport and for use on the site. Manufacturing processes and percentage content of materials as shown in table no.1

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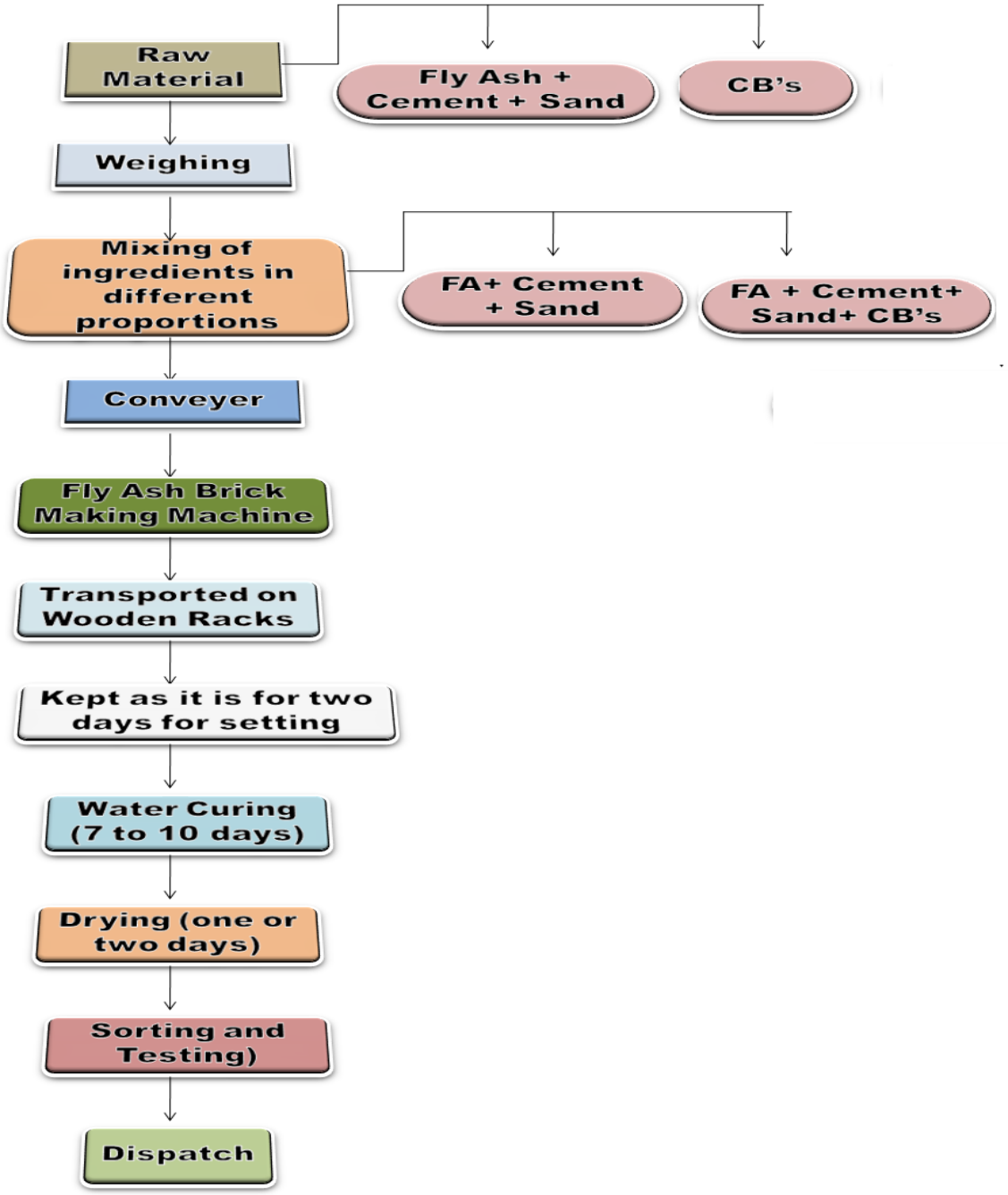

IV. RESULT & DISCUSSION

4.1 Test setup: The bricks are then tested in the testing laboratory of Civil Engineering Department. The testing is done in accordance to relevant IS codes of practices (IS 3495-1992; Standard Specifications on brick testing). The bricks are tested for dry compressive strengths, efflorescence.

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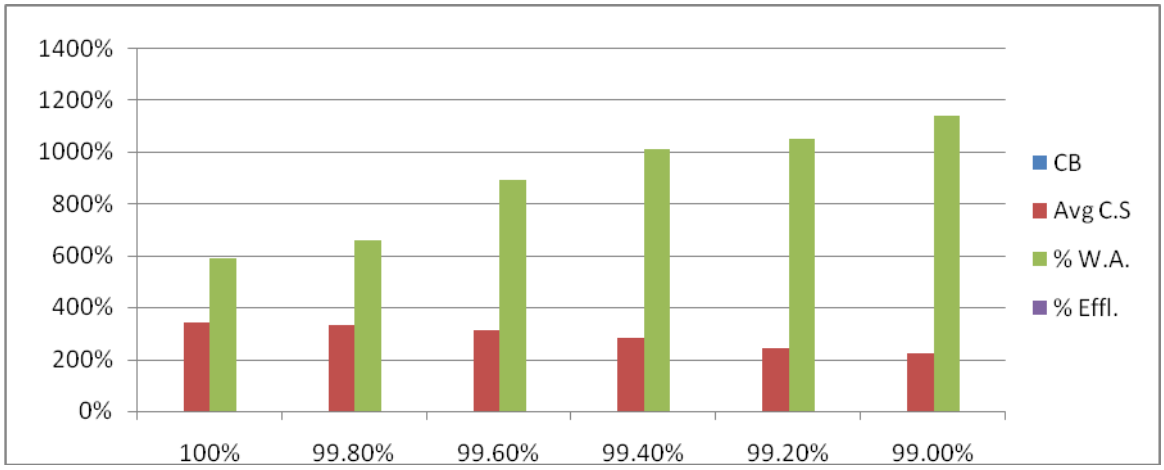
Table No.1 Showing Compressive Strength % Water Absorption and Efflorescence

SR. NO.	PROPORTION (FA+CB's) %		AVG. COMPRESSIVE STRENGTH IN N/MM^2	% Water Absorption	EFFLORESCENCE (%)
	Fly ash	CB's			
1	100%	0%	3.425	5.925	Nil
2	99.8%	0.2%	3.345	6.580	Nil
3	99.6%	0.4%	3.124	8.950	Nil
4	99.4%	0.6%	2.824	10.120	Nil
5	99.2%	0.8%	2.454	10.540	Nil
6	99.0%	1.0%	2.235	11.430	Nil



Graph No. 1 Showing Avg Compressive Strength, % Water Absorption and Avg % Efflorescence of Fly ash and CB'S

V. CONCLUSION

The disposing of cigarette butts has become a major global environmental concern as production and availability rate of these waste are rapidly increasing. Scientist/Engineers are exploring various methods of reuse, recycle and safe disposal of the above wastes in India and abroad. In influx population has increases the production of waste manifold and also environmental hazard.Considering factors as it is felt that it can be used in construction activities, for manufacturing of bricks, a common universally used material for construction work (residential, commercial and for industrial building).It is envisaged that shape/size/crushing etc., of these bricks will be suitable for partition/parapets walls. In addition these cigarette butts bricks can be used for low cost housing as they have more crushing strength than solid waste bricks. These kinds of bricks can be used in R.C.C framed structures where bricks are used as filing the panels.

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