

Design of Domestic Incinerator for the Safe Disposal of Menstrual Waste in the Rural Areas

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Abstract: The present research work deals with an effective solution to dump and dispose the menstrual waste with the help of an incinerator. The system involves an incinerator which uses electricity to heat the heating coil which in turn will lit up the sanitary napkins when dumped into the incinerator. The principle of heat being generated when current is passed through a resistance is employed in various household appliances like electric iron, water heaters. Although the disclosed device has the same principle of operation, here the heat produced is used to burn the sanitary napkin which is dumped into the incinerator. For this purpose, the most commonly used heating coil made up of nichrome alloy is used. The sanitary napkins primarily surrounded by papers will have an ignition temperature of around 250 to 300°C. When the sanitary napkin burns, it is reduced to ashes. The burnt ashes will be collected at the removable ash collector being rigidly tightened to the upper part of the incinerator. The incinerator is surrounded by a refractive material, primarily silicon-di-oxide. The outer most layer of the incinerator is made up of Bakelite for easy handling. The disclosed device is scalable in all aspects because the materials preferred for this investigation is easily reachable in the marketplace. This device can be used in all schools, colleges, hospitals and offices etc.

Keywords: Menstrual waste, Incinerator, Napkins & Heating coil

1. Introduction

The Total conditions to do with public health attempt to make public opinion has taken about a well take to change in the country, not town areas in the getting well of conditions to do with public health facilities in the villages including the institutions like schools, hostels, being healthy middles and so on. The disposal of waste is becoming a serious hard question. Both biodegradable and not biodegradable waste can make certain dangerous for being healthy, if exact and full removal is not done. In schools especially, throwing away of sanitary material and sanitary cloth in girls' rooms for giving body waste, wash is great-sized hard question. It has an effect on the right working of the vessels for body waste when has a tendency to in the room for giving body wastes, washing and serious being healthy problems if put about without care out in waste puts down or in the open [1]. There is an important need for sanitary waste removal successfully, particularly in terms of

getting greater, stronger, more complete price working well and simple skill for made of different part or menstrual waste disposal for schools.

Menstruation wastes are the wastes that are produced by a feminine in her reproductive periods. These wastes are formed during menstruation generally experienced as menses, periods, or monthly producing blood wheeled machine. Women have undergone intensification their own delicate designs to grip this stage. Knowledge about menstruation practices related to menstruation sanitation are of major about as it has a healthy force of meeting blow; if did not take care of, it leads to toxic shock condition, reproductive tract infections (RT), and other relation to the female sex part of diseases [2].

A. Menstrual Waste Disposal Techniques Used

Products used throughout menses and its disposal techniques vary from whether or not the lady stays in square measure geographical area geographic area geographic region} or urban and even whether or not there are adequate disposal facilities on the market for her. Most of the ladies lose their hygienical pads or other emission product into garbage bins that ultimately become a vicinity of municipal solid waste. In urban areas, wherever trendy disposable emission product square measure used they dispose of them by flushing in bogs and throwing in dustbins. In rural areas, women use reusable and non-commercial hygienical materials like reusable pads or cloths, thus generating lesser quantity of hygienical waste as compared to those victimization disposals and one-time used pads in huge cities. Rural areas give more choices for disposing menstrual waste like by concealment, burning, and throwing in garbage or in pit latrines. The disposal technique of an emission product for the most part depends even on the cultural beliefs and location or time of disposal, since menses remains thought of as one thing to be kept non-public and incommunicative, ladies choose to dispose their product or wash them in private and bury or burn solely at nighttime or once no one, particularly men square measure around. At some locations, incinerators square measure used for disposing emission waste product however thanks to shyness or concern of being seen by others they eluded victimization it. A depiction of how sanitary waste

in handled in different stages. Source: 1Management of Menstrual Waste.

B. Sorts of absorbents used during menstruation

Being given a higher position of sanitary fortification material is based on individual good quality, art and learning acceptability, economic position, and able to use in nearby market. Beside with basic circumstances to do with public health buildings, one should face the situation with soap and menstrual absorbents to handle menstruation hygiene. The selection of absorbents becomes different among country, not town and of a town women and girls [3].



Fig. 1. Reusable Pads



Fig. 2. Commercial Sanitary Pads



Fig. 3. Tampons



Fig. 4. Menstrual Cups



Fig. 5. Banana Fibre Pads



Fig. 6. Water Hyacinth Menstrual products

In our country, not town fields, the most supported absorbents are reusable cloth puts soft material round. Chlorine bleached kraft or Sulphate pulp is used by the producer to manufacture small piece of soft material crushed wood for making paper as able to take up to make use and put to side sanitary products. Presently, many deodorized and non-deodorized sanitary goods are ready in the marketplace made of produced by uniting thread rayon. These deodorized products have within chemicals like organ chlorines, which have antibacterial activity. As a consequence of, in relation to their chemical composition, these products when put under earth in the land they put to death the soils micro flora and loss of time the progression of break-down [4]. Different menstrual products used by women/girls are shown in figure 7.

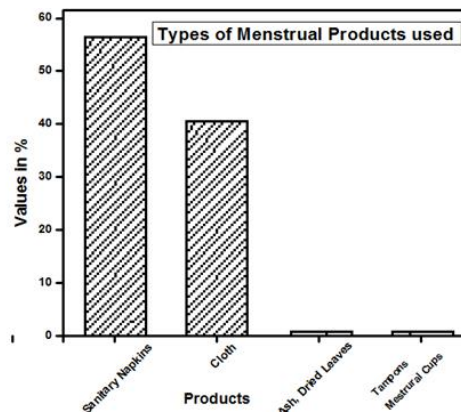


Fig. 7. Types of menstrual products

C. Incinerator

The innovative low cost technology incinerator design has been proposed for proper disposal of sanitary wastes [5]. This design is uncomplicated, secure and cost effective. The incinerator incinerates the wastes like soiled fabric, cotton

waste, sanitary napkins, paper towels etc. The waste gets rehabilitated into ash and other non-hazardous dregs. The incinerator is consumer responsive and manually operated.

D. Design specifications of Incinerator

The utility of the research work can be explained with the help of detailed design of the final product. The solid works software has been used to design the whole setup of the incinerator as shown in figure 8. With the intention that, it is easy to explain the project function.

Table 1
 Specification of Incinerator

S. No.	Description	Specification
1.	Incinerator	Size Diameter – 1 m Height – 1 m Material used Outer wall - Bakelite Inner wall – Silicon Dioxide
2.	Heating coil	Material Nichrome wire Size of wire 18 AWG Max Temp 760°C Power capacity 1800W Input Power 240 Volt 15 Amps

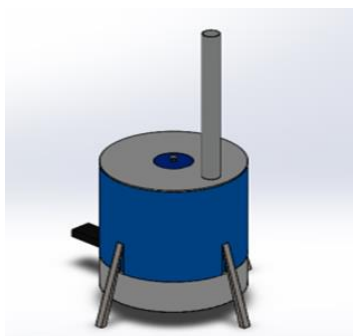


Fig. 8. Total assembly

E. Operating procedure

Open the lid at the top and throw the used sanitary napkins into it. Then close the lid and switch on the power supply so that the 240 volt and 15 Amps current passes through the heating coil which gets heated up. The heating coil is shown in figure 9. After the attainment of auto ignition temperature of rayon (420°C) which is the major component of sanitary napkins the burning gets started then wait for 30 minutes. Remove the bottom container shown in figure 10, using the handle given in the container. Throw away the collected waste at the bottom of incinerator in the form of ashes. Once it is cleaned then refits it properly to avoid ash leakage during the next process. The chimney tube is provided for the safe and distant exhaust of smoke out of our working environment. The entire apparatus is lined with refractory lining so that it prevents the heat transfer to the environment.

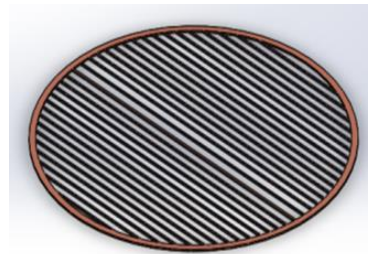


Fig. 9. Nichrome heating coil

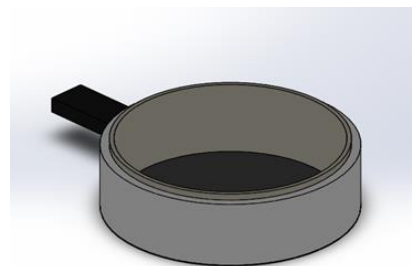


Fig. 10. Bottom container

F. Ease of maintenance

The main concern to the success of every product is the maintenance of the product. Here the incorporated the materials in this design requires low maintenance. In the outer side wall of this product is built with Bakelite, which is heat resistant material and also overcomes the problem of rusting since it is nonmetal. Inner side of the incinerator is equipped with Silicon Dioxide (SiO₂) as refractory material which has longer life and also a low cost material⁶. The heating coil is manufactured by Nichrome which the most common is heating element used in all type of heating elements.

G. Sustainability

The proposed design is rigidly construct with heat resistant and corrosion resistant material to ensure the longer life of the product. Since it is a stationary operating machine, it does not subject to external loads. The main component which is responsible for proper operation of the system is heating element. Heating coil can operate at high voltage deflections and coil will not affect by oxidation [7].

H. Environment friendliness

Since the project is concerned about to minimize the environmental pollution produced by the disposal of hazardous bio medical waste such as sanitary napkins [8]. It was ensured that the proposed model does not degrade at any circumstances and it will not affect the environment [9]. The final product from this incinerator is biodegradable ash.

I. Affordability

The proposed model has developed with simple in construction and low cost materials are selected [10]. Manufacturing of this product requires less time as compared with other designs which are readily available in the market.

J. Potential Environmental Impact

Over a billion non-compostable sanitary pads square measure creating their means into sewerage systems, landfills, fields and water bodies in India each month, move large environmental and health risks. With taboos and superstitions galore concerning ill women in India, safe technologies and interventions to dispose and treat expelling waste have become an enormous challenge. (“How Disposable sanitary Napkins have an effect on Environment”, 2017) A Life Cycle Assessment of tampons conducted by the Royal Institute of Technology in Stockholm, found that the biggest impact on warming was caused by the process of LDPE (low-density synthetic resin, a thermoplastic created from the compound ethylene) employed in tampon applicators yet as within the plastic back strip of a Kotex requiring high amounts of fuel generated energy. (“Occupational health of waste pickers in Pune: KKPKP and SWaCH members push for health rights”, 2013) A year’s price of a typical female hygiene product leaves a carbon footprint of five. 3 kilo carbonic acid gas equivalent. (Shreya, 2016) An average lady can use around sixteen,000 or a lot of tampons or pads in her lifespan. That’s seven billion tampons and pads landing in landfills every year. Most of them contain chemicals, toxins, additives and artificial materials like plastic. The plastics, first of all, take an awfully while to breakdown. Second, they additionally find yourself leaky into nature, and polluting our rivers, lakes, streams and world. (Syren, 2016) In 2010, a Britain beach clean found a median of twenty-three sanitary pads and nine tampon applicators per klick of British coastline. Non-organic sanitary merchandise square measure made of cotton that was sprayed with chemical pesticides, that destroy variety and cause probably deadly chemical poisoning in cotton employees. (“Seeing RED: sanitary Protection and therefore the Environment”).

K. Magnitude of the Sanitary Waste Problem

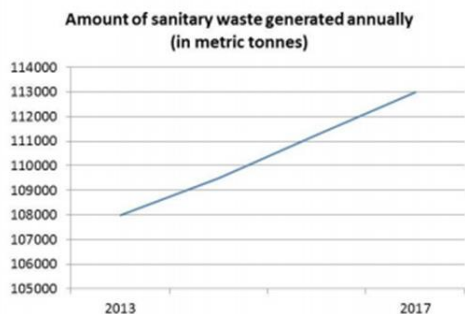


Fig. 11. A graph showing the increment in the generation of sanitary waste over a period of 4 years

As the usage of hygienical napkins is increasing, the number of hygienical waste generated each day is additionally increasing. it’s equally necessary to deal with the problem of efficient disposal of this infectious waste. presently as we have

a tendency to see, a significant a part of this waste is drop into landfills resulting in tremendous land pollution. hygienical napkins square measure flushed down the bathroom underneath the name of convenience. All the drains ultimately meet the rivers within the town and so pollution will increase. As seen within the higher than case-study, health of the waste pickers is affected to a good extent. These issues can increase in magnitude within the years to come back if not taken care of at this important stage.

2. Conclusion

Still there are many village women in India are suffer a lot because of this problem even some will omit schools during those menstruation days. And there is no proper solution for the disposal of those wastes. The improper disposal of menstrual waste in open environmental condition will affect the health of the surrounding population in a great manner. With the intention that, this proposed setup is to overcome the tremendous hazard of disposal of these wastes. As a responsible citizen of our country is to maintain the environment neatly, taking it in mind the model has been designed and also ensures the performance of it.

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