

BASIC BIOMEDICAL ENGINEERING TERM PROJECT REPORT

Submitted To:

Prof.Dr.Saurabh Gupta

Department Of BIOMEDICAL ENGINEERING:

National Institute Of Technology,Raipur



Submitted By:

Sarthak Kulshrestha

B-Tech 1st Semester

Biomedical Engineering

Roll Number:21111051

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-Sarthak kulshrestha

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2 ABSTRACT-

As in today's time waste management is a bigger and serious problem it needs to be managed and decompose properly. Like in time of Covid-19 pandemic decomposition of masks,vaccine, PPE kit is need of hour and hence it need to be managed with help of incinerator machine.

There is a large need of proper waste management system.So in this report I have discussed about basic Incinerator machine its advantages, disadvantages and waste materials released by it.

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3 INTRODUCTION-

Incineration is the main waste-to-energy form of treatment. It is a treatment technology involving destruction of solid waste by controlled burning at high temperatures. It is accompanied by the release of heat. This heat from combustion can be converted into energy. Incineration is a high-quality treatment for Municipal Solid Waste (MSW), very useful in big or crowded cities, because it reduces the quantity and volume of waste to be land filled. Medical waste incineration involves the burning of wastes produced by hospitals, veterinary facilities, and medical research facilities. These wastes include both infectious ("red bag") medical wastes as well as non-infectious, general house-keeping wastes.

The environmental conditions of the incineration process must be very precise to make it environmentally safe. The larger portion of the investment required is due to environmental measures such as emissions control. When choosing incineration as an alternative, the following issues should be considered: volume/quantity of waste produced, heat of combustion of waste, site location, dimensions of the facility, operation and maintenance costs and investment.



INCINERATOR MACHINE[PORTABLE]

4 Biomedical Waste Types-

1.Hospital waste:refers to all waste, biological or non- biological that is discarded and not intended for further use.





2.Bio-medical waste: means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals.

3.Infectious waste: The wastes which contain pathogens in sufficient concentration or quantity that could cause diseases. It is hazardous e.g. culture and stocks of infectious agents from laboratories,waste from surgery, waste originating from infectious patients.

4.1 Sources Of Biomedical Waste-

- 1.Hospitals
- 2.Nursing homes
- 3.Clinics
- 4.Medical laboratories
- 5.Blood banks
- 6.Mortuaries
- 7.Medical research training centers
- 8.Biotechnology institution/production units
- 9.Animal houses etc.

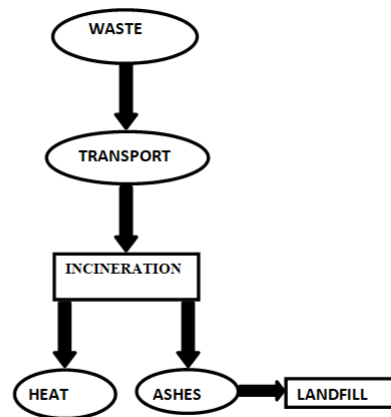
Rule 1998 schedule II

Color coding	Type of container	Waste categories
Yellow 	Plastic bags	Cat 1 human anatomical waste Cat 2 Animal Waste Cat 3 Microbiological Waste Cat 6 Solid Waste
Red 	Disinfected container plastic bags	Cat 3 Microbiological Cat. 6 Soiled Dressing
Blue/white 	Plastic bags, puncture proof containers	Cat. 4 Waste sharp Cat.7 Plastic disposable
Black 	Do	Cat. 5 Discarded medicine Cat. 9 Incineration ash Cat 10 Chemical Waste

5 INCINERATION PROCESS-

Incineration is the process of direct controlled burning of waste in the presence of oxygen at temperatures of about 8000 C and above, liberating heat energy, gases and inert ash. Net energy yield depends upon the density and composition of the waste.

The combustion temperature of conventional incinerators fuelled only by wastes are about 7600C in the furnace and in excess of 8700 C in the secondary combustion chamber. These temperature are needed to avoid odour due to incomplete combustion but are insufficient to burn or even melt some of the inorganic contents such as glass. To avoid the deficiencies of conventional incinerators, some modern incinerators utilise higher temperature of up to 16500C using auxiliary fuel. These reduce waste convert to ashes.



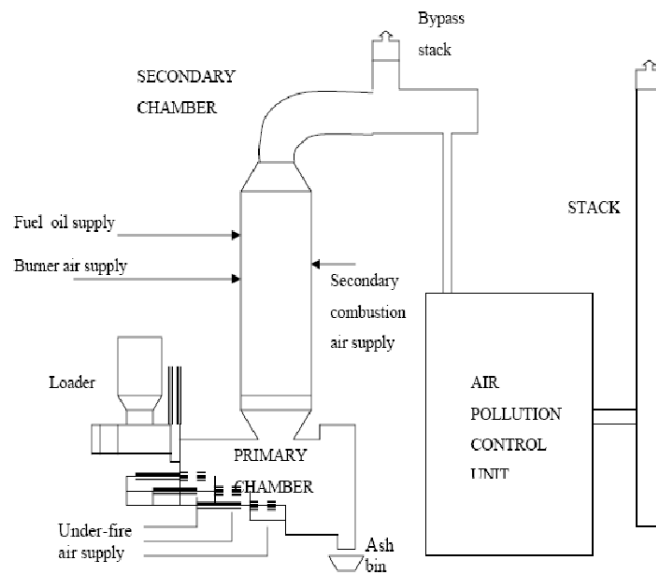
5.1 STEPS IN INCINERATION PROCESS-

The basic operational steps of a waste incineration plant may include the following:

1. Reception of incoming waste.
2. Storage of waste and raw materials.
3. Pre-treatment of waste.

5.1 STEPS IN INCINERATION PROCESS-INCINERATION PROCESS-

4. Loading of waste into the process.
5. Thermal treatment of the waste.
6. Energy recovery and conversion.
7. Flue-gas cleaning.
8. Flue-gas cleaning residue management and Flue-gas discharge.
9. Emissions monitoring and control.
10. Waste water control and treatment (e.g. from site drainage, flue-gas treatment, storage).
11. Ash/bottom ash management and treatment (arising from the combustion stage).
12. Solid residue discharge/disposal.



5.2 INCINERATION RESIDUE-

The main residue from MSW incineration is slag. The amount generated depends on the ash content of the waste. In the combustion process, the volume of waste from high income cities will by experience be reduced by approximately 90 percent.

The other residues must, however, be disposed of. Therefore, a well-designed and well-operated landfill, preferably located in abandoned mine shafts or other places where leaching with rainwater can be prevented must be available. These ashes can be disposed in landfills or ashes can also be used to help clean up wet paint drips on an outdoor pavement or any concrete surface. Just rub a little ash over the drips and it helps mask tint left behind from the paint.

6 ADVANTAGES OF INCINERATION PROCESS-

1. Decreases Quantity of Waste
2. Efficient Waste Management.
3. Production of Heat and Power.
4. Incinerators Have Filters For Trapping Pollutants.
5. Saves on Transportation of Waste.
6. Provides Better Control Over Odor and Noise
7. Prevents the Production of Methane Gas

7 DISADVANTAGES OF INCINERATION PROCESS-

1. It is expensive and The installation of an incineration plant is an expensive process.

2. Pollutes the Environment.
3. Damaging Public Health.
4. Ash waste can potentially harm people and the environment as it contain harmful poison.

8 OTHER APPLICATION-

Heat generated by incinerator can help to run turbine to generate electric energy. Another application is "Thermoelectric Generator" that converts heat energy produced from a heat source directly into electrical energy. This phenomenon is called the Seebeck Effect. It can be used to make an electric current flow through a metallic surface and thus protect it from corroding. Instead of using coal as a fuel for incineration people can use ethanol as fuel which will lead to less pollution.

9 CONCLUSION-

All sorts of waste materials are generated in the Indian cities as in other countries. However, in the absence of a well-planned, scientific system of waste management (including waste segregation at source) and of any effective regulation and control of rag-picking, waste burning and waste recycling activity, the left-over waste at the dumping yards generally contains high percentage of inert gases.

Incineration, therefore, has not been preferred in India so far. The only incineration plant installed in India at Timarpur, Delhi way back in the year 1990 has been lying inoperative due to mismatch between the available waste quality and plant design. However, with the growing problems of waste management in the urban areas and the increasing awareness about the ill effects of the existing waste management practices on the public health, the urgent need for improving the overall waste management system and adoption of advanced, scientific methods of waste disposal, including incineration is imperative.