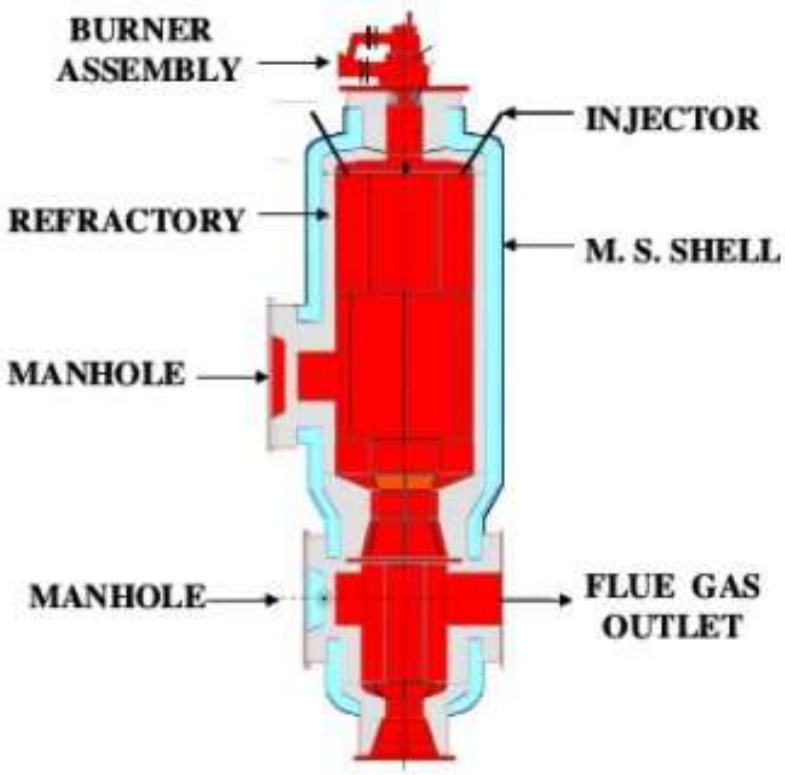
Email Address
water@watermanaustralia.com

BIOMEDICAL WASTE INCINERATOR SYSTEM (SOLID-LIQUID WASTE INCINERATOR SYSTEM)



Biomedical Waste Incinerator System (Solid-Liquid Waste Incinerator System)

WATERMAN ENGINEERS AUSTRALIA

Overview

Every Industry may be different surely, but have one thing in common, that is waste.

Disposing waste effectively for industries is a shared challenge. Industrial waste varies in many ways like in size, content, and calorific value. Disposal methods vary with the type of wastes to be disposed of for their safe and secure disposal.

Incineration is the most cost-effective and promising way to dispose of your industrial waste.

The term ‘incinerate’ means to burn something until nothing remains but sterile ash. High levels of heat are kept inside the furnace such that the waste is burnt faster and more effectively.

‘Flue gases’ are produced from this process of waste burning. In a Double chamber incinerator, these gases are also incinerated in the second chamber followed by a wet scrubber, cyclone separators, and chimney. The flue gases are cleaned of impurities before dispersing them in the atmosphere.

Thus, Dual-chamber systems are run by incinerating materials in a primary chamber and then incinerating the gases for a few seconds in a secondary chamber. Afterward, emissions from this system are cleaner and safer for the environment.

Primary Chamber

All waste is loaded and incinerated firstly in the primary chamber and then volatilization occurs. In this starved-air chamber, the low air to fuel ratio dried up and enhanced the volatilization of the waste and most of the carbon fumes. The temperature range of the primary chamber is 800+/-50 degrees Celsius.

Secondary Chamber

Volatile matters from waste are then taken up to the secondary chamber. Then excess air is added to the volatile gases formed in the primary chamber to perform combustion. The temperature here is comparatively higher than in the primary ones. Volatile matter is completely oxidized in this chamber due to sufficient residence, high temperature, and cent percent excess air. After being treated from here, gases finally enter the droplet separator wherein the moisture is nullified from them. This reduced the flue gas temperatures making it safe to be disposed of in the atmosphere. The temperature range of the secondary chamber is 1000+/- 50 degrees Celsius.

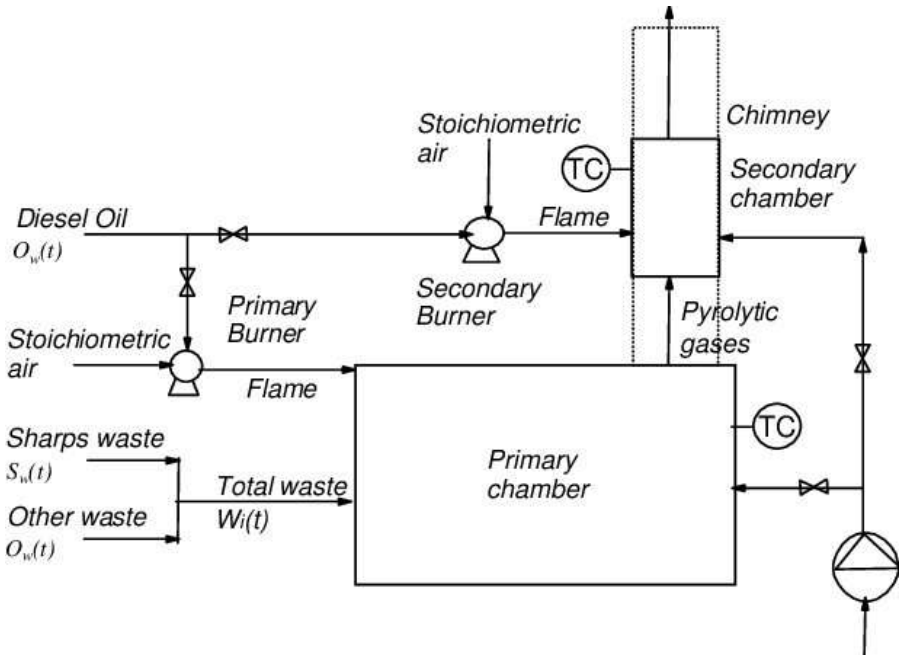


Figure 1: A typical flow diagram of an incinerator assembly

Tertiary Chamber

An optional chamber many countries prefer to use totally depending on their cost, amount of waste, and nature of waste. There is the compulsion of two chambers in some countries like Australia, Europe, the USA, Canada to prevent the formation of harmful chemicals. In many countries, this is a law that all the flue gas must stay in this secondary chamber for at least 2 seconds at 850 degrees Celsius.

Combustion Process

Incineration is the process of burning infectious medical waste to render it harmless and reduce it by up to 90%. Proper incineration can convert specific wastes into gases and incombustible solid residues that are comparatively less harmful. A dual-chamber incinerator worked within the optimal temperature range of 650 to 1000 degrees Celsius, which results in lower emission levels. Incineration gases are released into the atmosphere.

Medical Waste Incinerator

Medical waste is usually a solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining to or in the production or testing of biologicals. According to WHO, medical waste is classified into sharps, infectious, pathological, radioactive, pharmaceuticals, and other such things.

Hospital medical waste or biomedical waste has the possibility to affect humans in non-infectious methods. Chemicals, both medical and industrial, can also be included. Some hazardous waste can also be an infectious waste, depending on its usage and exposure to human or animal tissue prior to disposal.

Old medications can be dangerous because they contain mercury. Mercury in dental amalgams, dental amalgams sometimes referred to as ‘silver filling; is a silver-coloured material used to fill teeth that have cavities. Amalgam has long been one of the most popular tooth filling materials. If the dental amalgam is incinerated, mercury may be emitted into the air from the incinerator stacks. Mercury compounds in certain preservatives, fixatives, and, reagents used in hospitals.

Biomedical Waste Incinerator System

WFS Incinerator is a biomedical waste incinerator machine that was developed on the basis of Japanese technology, it features unique and advanced advantages with compact size, high burning effect, reasonable burning technology, a high rank of non-harm, etc. It is an efficient choice for waste treatment in hospitals, hotels, and other such areas in the localities.

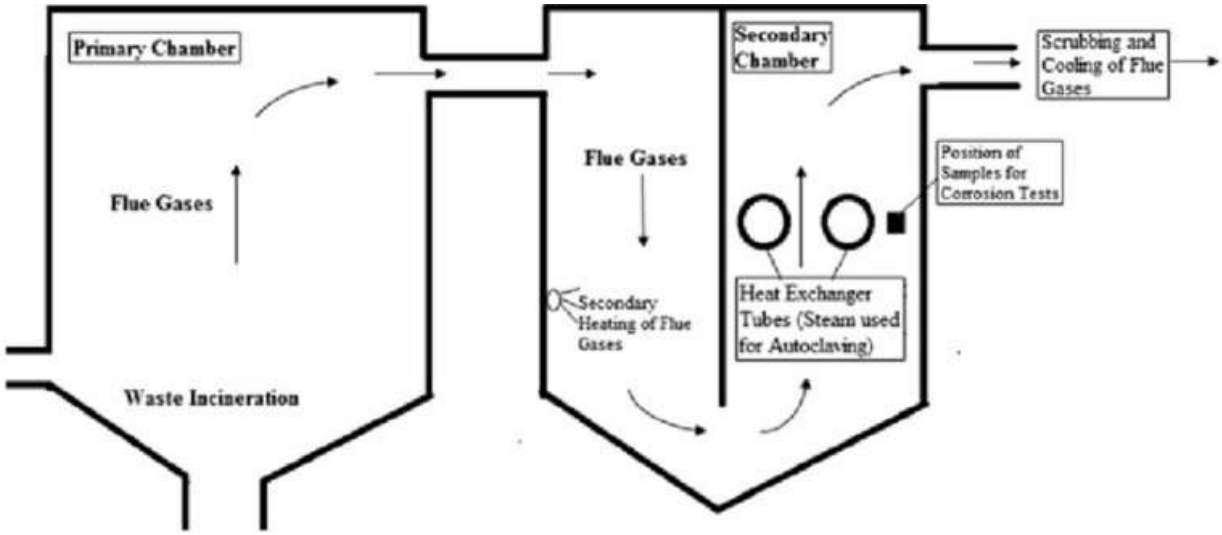


Figure 2: Schematic Diagram of Hospital Waste Incinerator

Bio Medical Waste Incinerator System Technical Benefits

- 3D Video guide
- Technical Drawing
- English Manual
- Advanced Engineer’s Control

Biomedical Waste Incinerator Advantages

- Long-lasting
- Highly enclosed operation
- Suitable for treating many kinds of MSW
- Avoid secondary pollution
- Simple operation

Main Features for Biomedical Waste Incinerator System

- Gasified incineration is beneficial for burning many kinds of waste
- Both gas- motivated and oil- motivated are all can be customized according to the customer’s needs.
- Gasified incineration can burn all the daily waste.
- Gasified incineration, mixed incineration ensures low emission standards of dust, dioxin, etc.
- Completely enclosed operation is recommended for treating infectious waste to avoid secondary pollution.
- Compact structure and less land business.

Bio Medical Waste Incinerator System Applications

- Hospital medical waste: Bandage, Paper/ syringes/ needles/ injection/ drop bottle. Drugs, infectious materials.
- Infectious diseases animal body/ fur/ hair, extensively used in pet carcasses disposal: cattle, fish, chicken, duck, etc.
- Municipal or Domestic daily home waste
- Disposable plastic waste
- Other industrial waste.

Emission Standards

The following table shows the incinerator flue gas emission standards:

Sr No.	Pollutant Name	Measuring Unit	Statistics
1	Carbon Monoxide	mg/m^3	100
2	Sulfur Dioxide	mg/m^3	400
3	Hydrogen Fluoride	mg/m^3	9.0
4	Hydrochloric Acid	mg/m^3	100
5	Nitrous Oxide	mg/m^3	500
6	The blackness of flue gas	Ringelmann class	I
7	Smoke & Dust	mg/m^3	100

Chemical Waste Incinerators

Waste Incinerators can be used to manage the waste of many other chemical industries like:

- Petrochemical
- Pharmaceutical
- Insecticides
- Dyes Intermediate Industries
- Static – Liquid/ Gaseous Injection, Fluid Bed Incinerator
- Non-static Rotary Kiln

Applications of Chemical Waste Incinerators

- Low melting distillation bottoms
- Organic Liquid Waste
- Waste Waters
- Gaseous Waste
- High Fluorine containing waste

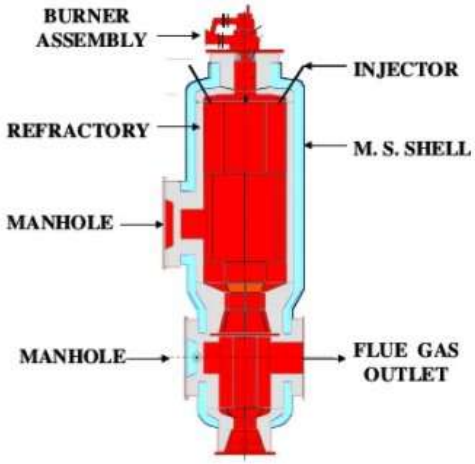


Figure 3: A typical liquid gaseous injection

Merits and Demerits of Liquid Waste Incinerators

Merits	**Demerits**
No secondary Combustion Chamber	For only customizable liquid waste
Simple Construction	Not suitable for slurries of large size solid particles
No moving parts	
Suitable for gaseous waste	
Low maintenance required	
Accepts a wide range of liquid / Gaseous Waste	

Fluidized Bed Incinerators

Applications of Fluidized Bed Incinerators

- Distillation Bottom Tars
- Organic liquid and semi-solid waste
- Sludge with high moisture content
- Organic sludge
- Pharmaceutical Sludge
- Aqueous Waste containing sodium sulfate and sodium
- Granular, Powdery waste

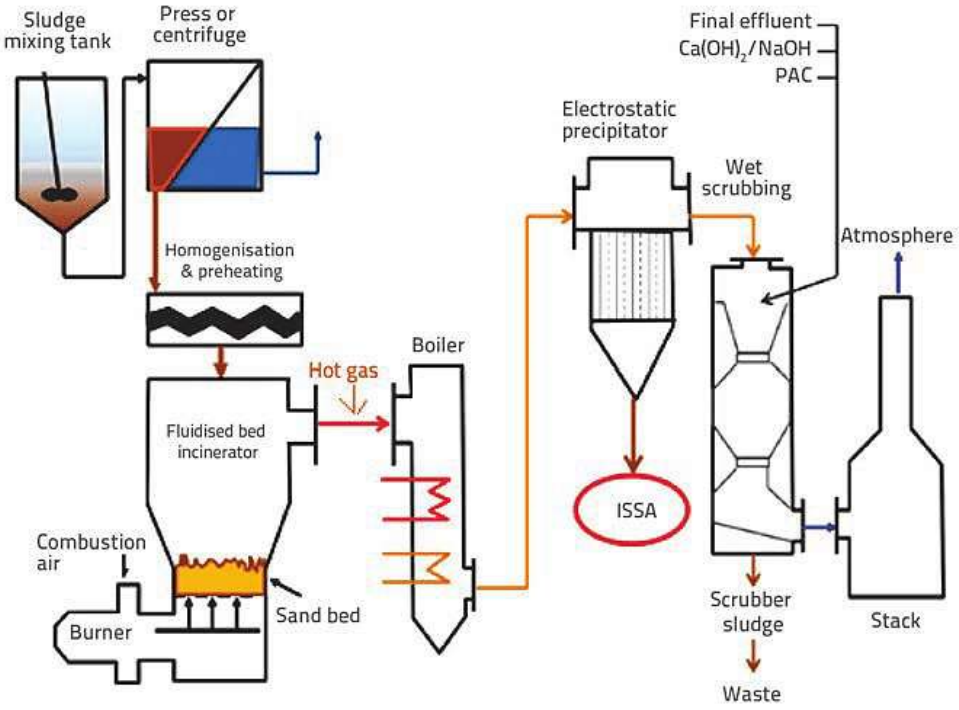


Figure 4: Schematic Diagram of Fluidized-bed incinerators

Rotary Kiln Incinerators

In the kiln, temperatures typically range between 850 and 1300 degrees Celsius. The slow rotation of the drum allows for a 30-90-minute residence duration. In the Kiln, solid sludge containerized, or pumpable waste is introduced at the inclined drum's upper end.

The oxidation of combustion gases is finalized in the second combustion chamber after the kiln. Liquid wastes and auxiliary fuels can be injected alongside secondary air to maintain a minimum residence duration of two seconds and temperatures between 900 and 1300 degrees Celsius, thereby removing the leftover remaining organic matters.

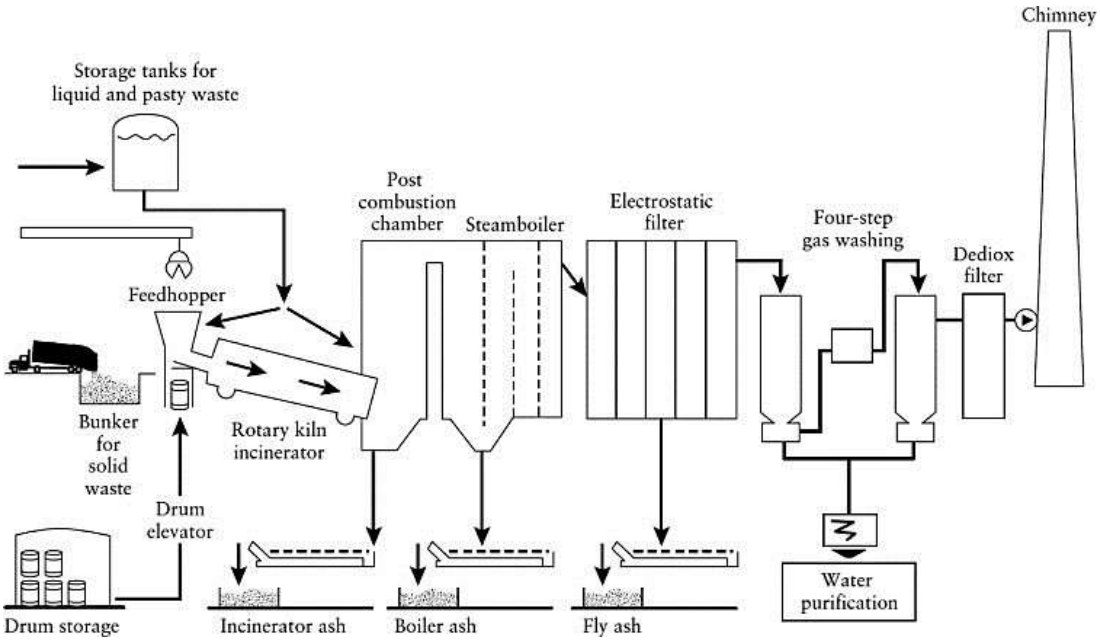


Figure 5: Schematic Diagram of Rotary Kiln Incinerators

Merits	Demerits
Suitable for all kinds of wastes	Expensive for low feed rates
Feed capability for Drums & bulk containers	Subject to high wear & tear
Can be operated at high temperatures	Relatively low thermal efficiency
Residence time adjusted by varying kiln speed	carryover
Waste feeding- without much preparation	Air leakage possible without good sealing

Feeding system of solid and liquid waste incinerators:

The feeding system for liquid waste and solid waste is entirely different. Hospital waste is usually solid waste and equipment used for them is accordingly. The feeding system is usually based on chamber systems.

In the case of chemical wastes, the waste is in liquid form so the feeding system varies here, and depending on the nature of waste, the system varies accordingly as represented in the above figures.

Biomedical Waste Incinerator System Frequently Asked Questions

1) What is incineration of biomedical waste?

Hospitals, veterinary clinics, and medical research institutes all produce garbage, which is burned during medical waste incineration. Both contagious ("red bag") medical wastes and non-infectious, normal household wastes are included in these wastes.

2) How is medical waste incinerated?

One way of treating HCW before final disposal is incinerating it at high temperatures. Pathogens are removed, and waste volume is decreased. If a high-quality incinerator and an experienced operator are available, it is more efficient than open-air burning and generally preferred.

3) How does the incineration process work?

Burning of waste takes place in a single, oxygenated combustion chamber. Extremely high temperatures of 1,800–2,200 degrees Fahrenheit are used to burn materials. Waste should totally burn away at those temperatures, leaving just fumes and ash behind.

4) What are the types of incineration?

Controlled air, surplus air, and rotating kiln are the three primary types of incinerators employed.

5) What is solid waste incineration?

Incineration is the process of burning garbage at a high temperature (rapid oxidation). It is a process that eliminates organic components in waste materials and is also referred to as controlled-flame combustion or calcination. For this burning process, new ways that produce energy are being explored.

6) What are the types of biomedical waste?

Infectious, hazardous, radioactive, and normal medical waste are the four main categories.

7) What is incineration of liquid waste?

Waste Liquid Incineration System is used to safely and effectively treat a variety of liquid wastes that are discharged from different production processes in the petrochemical, fine chemical, pharmaceutical, agrochemical, pulp, and other industries. This technology has a wide range of potential uses.

8) What is the advantage of solid waste incinerator?

The following benefits of trash incineration: Volume reduction is crucial for bulky solids or garbage that includes a lot of moisture or flammable material. Particularly for biological waste, materials that have been pathologically contaminated, poisonous organic chemicals, and combustible carcinogens, detoxification is necessary.

9) What are the disadvantages of incinerating solid wastes?

Waste incineration creates and/or releases dangerous chemicals and pollutants, including: Air pollutants like particulate matter, which cause lung and heart ailments, regardless of what is burned (mixed municipal solid waste, plastic, outputs from "chemical recycling").

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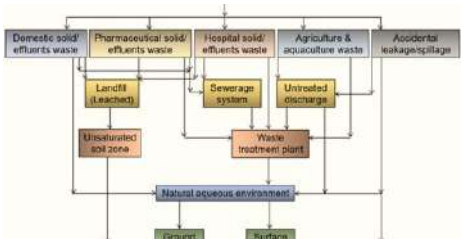

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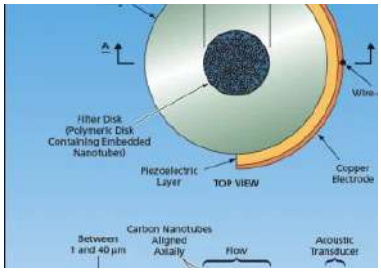

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