

# SWATCH

## Waste Destruction / Decomposition System

(Sustainable Innovative concept in Mixed Solid Waste Decomposition)

### WHAT IS MSW?

#### Four Broad Categories Solid Waste

- Organic waste: kitchen waste, vegetables, flowers, leaves, fruits.
- Toxic waste: old medicines, paints, chemicals, bulbs, spray cans, fertilizer and pesticide containers, batteries, shoe polish.
- Recyclable: paper, glass, metals, plastics.
- Soiled: hospital waste such as cloth soiled with blood and other body fluids.

### MIXED SOLID WASTE (MSW)



Mixed solid waste (MSW) consists of household waste, kitchen waste, vegetables, flowers, leaves, fruits, papers, plastics, glass, metals, medicines, sanitation residue and waste from streets. This garbage is generated mainly from residential and commercial complexes.

With rising urbanization and change in lifestyle and food habits, the amount of municipal solid waste has been increasing rapidly and its composition changing. More than 25% of the municipal solid waste is not collected at all; 70% of

the Indian cities lack adequate capacity to transport it and there are no sanitary landfills to dispose of the waste. The existing landfills are neither well equipped nor well managed and are not lined properly to protect against contamination of soil and groundwater.

### HAZARDOUS WASTE



Industrial and hospital waste is considered hazardous as they may contain toxic substances. Certain types of household waste are also hazardous. Hazardous wastes could be highly toxic to humans, animals, and plants; are corrosive, highly inflammable, or explosive; and react when exposed to certain things e.g. gases.

India generates around 7 million tons of hazardous wastes every year, most of which is concentrated in four states: Andhra Pradesh, Bihar, Uttar Pradesh, and Tamil Nadu.

Household waste that can be categorized as hazardous waste include old batteries, shoe polish, paint tins, old medicines, and medicine bottles.

In the industrial sector, the major generators of hazardous waste are the metal, chemical, paper, pesticide, dye, refining, rubber industries.

Direct exposure to chemicals in hazardous waste such as mercury and cyanide can be fatal

## HOSPITAL WASTE



Hospital waste is generated during the diagnosis, treatment, or immunization of human beings or animals or in research activities in these fields or in the production or testing of biological. It may include wastes like sharps, soiled waste, disposables, anatomical waste, cultures, discarded medicines, chemical wastes, etc. These are in the form of disposable syringes, swabs, bandages, body fluids, human excreta, etc. This waste is highly infectious and can be a serious threat to human health if not managed in a scientific and discriminate manner. It has been roughly estimated that out of the 4 kg of waste generated in a hospital at least 1 kg would be infected.

Hospital waste contaminated by chemicals used in hospitals is considered hazardous. These chemicals include formaldehyde and phenols, which are used as disinfectants, and mercury, which is used in thermometers or equipment that measure blood pressure. Most hospitals in India do not have proper disposal facilities for these hazardous wastes.

Surveys carried out by various agencies show that the health care establishments in India are not giving due attention to their waste management. After the notification of the Bio-medical Waste (Handling and Management) Rules, 1998, these establishments are slowly streamlining the process of waste segregation, collection, treatment, and disposal. Many of the larger hospitals have either installed the treatment facilities or are in the process of doing so.

## ABOUT SWATCH

- Unique and distinct garbage Decomposition/Destruction Equipment.
- Developed & promoted by IES, Bangalore under Japanese Patented Technology.
- Special air space filled with super-strong magnetic and hyperthermia (300-450C).
- Dispose of the Garbage in a scientific way without consuming power or fossil fuel
- Decompose any type of Organic waste.
- Ability to reduce the volume of disposed Garbage by a ratio of 1/200 to 1/300 times.
- Bi-Product is a small volume of normal Ash of about just 1% of the input waste which can be taken to landfills (or) for improving Soil amendment and as a disinfectant.
- Speed of decomposition depends on moisture content of the waste.
- We strongly recommend to ensure the moisture level of MSW at less than 40% mark for optimum performance of the system.

## FEATURES / HIGHLIGHTS OF SWATCH

- **PATENTED TECHNOLOGY:** SWATCH system is patented in India and Japan for Technology, Design and Process.
- **THD METHOD:** Operates in low temperature Thermal Heat Decomposition (THD) method.
- **CMA TECHNOLOGY.** Functions on a Concentrated Magnetic Action (CMA) technology.
- **PROCESS AT PLASMA STATE.** After initial start up fire, destruction starts slowly by splitting the molecules into atoms These atoms further ionized as electron, proton and neutron and this state is called as “Plasma State”
- **SMALL FOOTPRINT.** A small floor space depending on the system size sufficient to accommodate Swatch system anywhere close to source.
- **QUICK & FAST.** Decomposition of waste takes place at a faster rate in 8 hours period for single badge load.
- **SELF POWERED, NO FUEL, NO BURNING.** Doesn't needs the combustion process, neither electricity nor fossil fuel used for closed chamber Destruction/Decomposition.
- **NO SEGREGATION.** Mixed Solid Waste (MSW) containing mixer of both dry and wet waste generated from households are suitable
- **DECOMPOSITION AT SOURCE.** De-Centralized and Scientific method of Disposal which avoids Costly logistics to transport the waste to landfills.
- **USER FRIENDLY** simple operation and easy to load, MSW garbage bags can be loaded 2-3 times a day as such collected from households
- **MOISTURE CONTENT** of the MSW recommended less than 40% for optimum decomposition .No liquids in food waste are acceptable which will harm the speed of decomposition process
- **NO POLLUTION, NO FLAMES, NO DIOXINS.** Does not produce any flames, thus generating dioxins and other poisonous gases are eliminated, even when plastics and PVC are processed
- **MASSIVE VOLUME REDUCTION.** Reduces the output by 99% from the amount of the input waste loaded.
- **BY PRODUCT** - Small volume of normal Ash of about just 1% of the input waste which can be taken to landfills (or) for improving Soil amendment and as a disinfectant
- **CAN'T DECOMPOSE** inorganic substances such as glasses, metal, sand, soil, ceramics etc.,
- **OPERATIONAL STANDARDS** are compatible to the norms and standards set by the Pollution Control Boards (PCB) of Karnataka, Andhra Pradesh, Assam
- **ZIRCON** rich refractory coating compound containing high percentage (63%) Zirconia applied over inner walls of chamber to protect from corrosion and erosion.
- **ECO FRIENDLY** - A total ECO FRIENDLY and 100% Environment compliance product

## **DESCRIPTION – SWATCH**

SWATCH system is a revolutionary equipment is a self powered, Non-Combustion type which uses the Thermal Heat De-composition (THD) method using Magnetic energy at low temperature around 350 to 400 Deg C to decompose any Organic/Medical wastes without using any Electricity or fuel , which has been developed and enhanced by using Japanese patented technology

IES adopts the unique patented Concentrated Magnetic Action (CMA) Technology from Japan where the organic waste are disposed scientifically by the method of in-taking a little atmospheric air through strong magnets without using any power/fuel to Destruct/Dispose the waste by magnetic heat decomposition method.

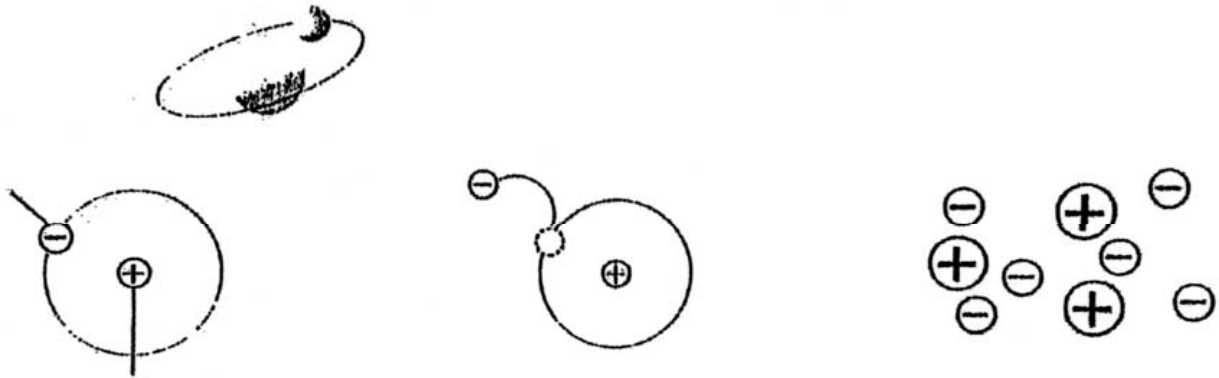
Flue gas emitted from the heating chamber after the destruction by using this technology complies as per CPCB guidelines of Waste Incineration specification limit.

On the other hand, the chamber temperature is regenerated to dry the input waste by which it will increase the volume of waste destruction.

## **THEORY OF SWATCH**

Plasma (is an ionized gas, in which some electrons are removed from atoms and molecules and are free) is created by permanent magnets at high temperatures, 300–400°C. When a small amount of oxygen is absorbed into the plasma, highly reactive, negatively charged oxygen ions (Atoms and molecules that have lost electrons are positive ions (positively charged); electrons that have been removed are negative ions (negatively charged) are formed. This oxygen (negative ions) is highly oxidative, thus decomposing dioxins and other harmful compounds by oxidation.

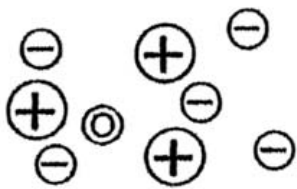
## ELECTRON



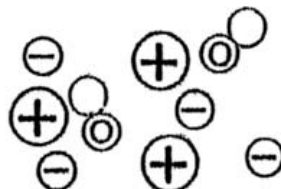
ATOMIC NUCLEUS

IONIZATION: AS ELECTRON IS REMOVED

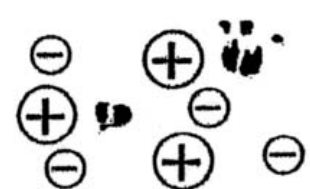
PLASMA: GAS IN AN  
IONIZED STATE



A Small amount of oxygen  
Is introduced into a plasma  
State gas



Atomic oxygen bonds  
to dioxins



Dioxins are Decomposed

## SWATCH – WORKING PRINCIPLE

Closed chamber Destruction with plasma and ionization techniques at OXYGEN STARVED condition. The decomposition temperature is around 350 – 450oC depends on the solid waste input. Do not require electric, other power or fuel for organic substances for decomposition

## PROCESS

Waste has to be feed into the chamber of equipment on uniform intervals. At the initial stage requires start up fire by using camphor/Dry wood afterwards destruction starts slowly by splitting the molecules into atoms. These atoms further ionized as electron, proton and neutron and this state is called as “plasma state” and separated electron change to “accelerated electron” with strong energy.

On the other side a small amount of atmospheric air is allowed to pass through strong magnetic field into Oxygen starved chamber. During this operation oxygen molecule split into elemental oxygen with negative charge. This atomic oxygen is to oxidize perfectly organic surface and change organic matter to

desperate organic oxide. Therefore reaction is induced by exothermic phenomenon, thermal condition around 200oC is needed to accelerate reaction which can achieve by initial decomposition.

From 200oC (by initial firing) to 350~450oC in the equipment by plasma, ionization and thermal vibration will achieve.

The decomposition of waste takes place on bed wise so that heat energy developed may not be continuous. At the bottom of the destruction chamber a tubular type radiator which makes buried near the lower layer of deposited ash and ash will be separated. The waste heat is recovered through a tubular heat sink arranged near the upper layer of deposited ash of a hearth center section of said combustion chamber and said hearth periphery and the entire structure will have good heat transfer potential. The waste heat is recovered back and supply to the wet waste where the moisture content is reducing phenomenally

The flue gas emission from the decomposition chamber is releasing with natural draft. The emission may contain some toxic components like Dioxin and Furan, Heavy metals, Nitrogen Oxides etc.,. The toxic components are destructed by using the external heating chamber with the heat of 850oC followed by wet scrubber by which can reduce substantially from 850oC to 180oC. During this process we can eliminate the reformation of Dioxin and Furan occurs and the clean gas is dispersing into atmosphere.

The non combustible waste and ash (inorganic) is collected separately and stored in well defined area for the disposal into Secured landfill. The ash quantity generation should be in the ratio of 1/300.

## **SOLUTION TO AIR POLLUTION**

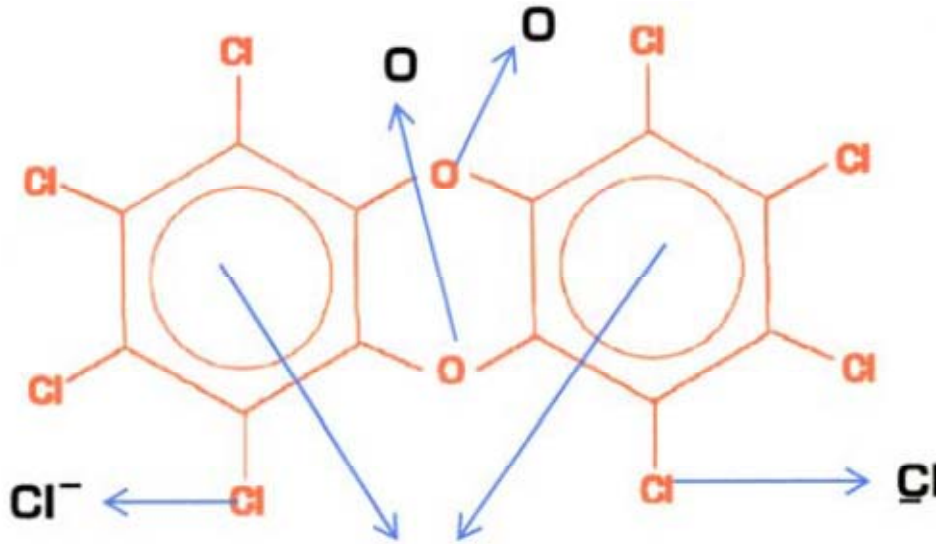
It has been suggested that one of the causes of dioxins in an incinerator is the retention of oxygen due to imperfect combustion and low processing temperature (300–350°C). Consequently, it became mandatory to process waste at high temperatures, at 800°C or higher, which requires installation of a secondary combustion system.

On the other hand, SWATCH Decomposition system processes waste at low temperatures; however, the generation of dioxins is inhibited. Why...How?

The answer is because it hampers the bonding of two benzene rings with oxygen by minimizing the supply of oxygen.

The system also inhibits the benzene rings themselves from being produced by utilizing the effect of anions which are generated when the waste passes through the Special magnetic device and enters a chamber.

Minimizes Oxygen Supply



Anions provide Electrons

The Cl<sup>-</sup> that has jumped out then bonds with ions such as Na<sup>+</sup> to form a stable compound. Further, it effectively acts on NO<sub>x</sub> and SO<sub>x</sub>, inhibiting the generation of harmful chemicals.

### SWATCH – DECOMPOSITION PROCESS

- (1) INPUT      (2) DECOMPOSTION      (3) AFTER DECOMPOSITION



## PHOTO'S OF SWATCH



## APPLICATIONS & RECOMANDED AREAS

- Industrial Sector (All kind of Organic waste)
- Government Sectors like Municipalities , Corporations etc
- Hospitals , Health Centres , Nursing homes
- Apartments , Villas , Shopping Complexes , Residential Complex
- Hotels , Restaurants , Stadiums , Sports centres
- Corporate Sectors, IT Companies
- Air ports , Railway Stations and Bus stations
- Marriage halls, Public and Private functions and ceremonies

## Priority Focus Areas

- Industries
- Star Hotels
- Builders
- Ayurveda Health Centres

## MODELS OF SWATCH- SYSTEM

- SP 100 - ~100kg/day (1 Cu. Mtr) Waste Destruction / Decomposition System
- SP 250 - ~250kg/day (2.5 Cu. Mtr) Waste Destruction / Decomposition System
- SP 500 - ~500kg/day (3.5 Cu. Mtr) Waste Destruction / Decomposition System
- SP 1000 - ~1 Mt/day (5 Cu. Mtr) Waste Destruction / Decomposition System

## The efficiency of the SP system depends on moisture content of the waste loaded into the machine

- If the average moisture level of the MSW is 20% and below, the performance of the system will go upto 120% level
- If the average moisture level of the MSW is 60% and above, the performance of the system will come down to 40% level

We strongly recommend to ensure the moisture level of MSW at less than 40% mark for optimum performance of the system

STABILISATION PERIOD: Initially SWATC system require min. 20-30 days time to reach operational stability to obtain optimum output in performance

## EMMISSION MEASUREMENT OF SWATC

Item	Unit	Result	Indian Regulation
Carbon Monoxide (CO)	mg/Nm <sup>3</sup>	88	>100
Carbon Dioxide (Co)	-	9%	-
Oxygen (O <sub>2</sub> )	-	10%	-
Nitrogen Oxide (NOX)	mg/Nm <sup>3</sup>	108	> 400
Sulphur Dioxide (SO <sub>2</sub> )	mg/Nm <sup>3</sup>	35	>200
Dioxin	ITEQ/Nm <sup>3</sup>	0.06	0.1
Particulate Matter	18	50	