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Bio-Medical Waste

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Abstract- The present paper is a review of practices adopted by hospitals in Buldana with respect to the bio-medical waste management norms. The study was undertaken to check whether the bio-medical waste management rules are being followed or not in hospitals, Clinics and diagnostic centers in Buldana. The present paper also attempts to provide a solution followed by recommendations based on its observation. It demonstrates some good practices adopted by some of the hospitals under the study. The main purpose of this paper is to spread awareness about the rules (colour coding, handling of waste etc.) of handling of biomedical waste in hospitals which can be followed if a little care is taken by each hospital staff in separating the waste at starting level itself. Mainly highlighting the harmful effects of biomedical waste to the environment if not disposed of properly. This paper also highlights the health hazards to the people handling this waste in the like laundry workers, nurses, medical personnel and other employees of the hospitals. Lots of the problem can be fenced if the Biomedical waste management is properly executed. The activities that are usually performed as part of health care waste management involve segregation, storage, collection, transportation and disposal of biomedical waste.
Index Terms- Bio-Medical Waste Management, Disposal.

1. INTRODUCTION

'Bio-Medical waste' means any waste generated during treatment of animals and human beings. Management of healthcare waste is an integral part of infection control and healthcare settings. Hospitals are a major contributor to community-acquired infection, as they produce large amounts of biomedical waste.

Biomedical waste can be categorized based on the risk of causing injury and/ or infection during handling and disposal. Wastes targeted for precautions during handling needles and sharpen accessories. Pathological wastes (anatomical body parts, microbiology cultures and blood samples), infectious wastes (items contaminated with body fluids and discharges such as dressing, I.V. lines). Other wastes are generated in the Hospitals.

According to Bio-Medical Waste Rules of 1988, India- Bio-medical waste is defined as "any waste which is generated during diagnosis, treatment of human beings and animals or any other waste produced during production or testing of bio-logical". This paper also highlights the health hazards to the people handling this waste in the like laundry workers, nurses, medical personnel and other employees of the hospitals.

2. LITERATURE REVIEW

The paper Need of Biomedical Waste management in Hospitals –An emerging issue-A Review by Praveen Mathur, Sangita Patan, and Anand S. Shobhawat, Department of Environment Science, MDS University, Ajmer. This paper talks about the impact of waste generated by the medical activities and their straight way impact on mankind. The paper highlights that disposal of BMW waste or exposure to such waste possess a serious threat to the environment and hence requires specific treatment or management before disposal. Other than that, the paper deals with the problems relating to bio-medical waste and procedures for handling and disposal method and also create awareness among health personnel regarding the biomedical waste.

3. METHODOLOGY

3.1 Types of Method

3.1.1 Gasification

Gasification can be broadly defined as the thermochemical conversion of a solid or liquid carbon-based material (feedstock) into a combustible gaseous product (combustible gas) by the supply of a gasification agent (another gaseous compound).

Gasification is a thermochemical process that generates a gaseous, fuel rich product. Regardless of how the gasifier is designed, two processes must take place in order to produce a useable fuel gas. In the first stage, pyrolysis releases the volatile components of the fuel at temperatures below 600°C (1112°F). The by-product of pyrolysis that is not vaporized is called char and consists mainly of fixed carbon and ash. In the second gasification stage, the carbon remaining after pyrolysis is either reacted with steam or hydrogen or combusted with air or pure oxygen. Gasification with air results in a nitrogen-rich, low BTU fuel gas. Gasification with pure oxygen results in a higher quality mixture of carbon monoxide and hydrogen and virtually no nitrogen. Gasification with steam is more commonly called "reforming" and results in a hydrogen and carbon dioxide rich "synthetic" gas (syngas). Typically, the exothermic reaction between carbon and oxygen provides the heat energy required to drive the pyrolysis and char gasification reactions. (EREN, 2002).

Gasifier Designs:-

The reactors used for the gasification process are very similar to those used in combustion processes. The main reactor types are fixed beds and fluidized beds.

Fixed Beds:-

Fixed bed gasifiers typically have a grate to support the feed material and maintain a stationary reaction zone. They are relatively easy to design and operate, and are therefore useful for small and medium scale power and thermal energy uses. It is difficult, however, to maintain uniform operating temperatures and ensure adequate gas mixing in the reaction zone. As a result, gas yields can be unpredictable and are not optimal for large-scale power purposes (i.e. over 1 MW). The two primary types of fixed bed gasifiers are updraft and downdraft.

Downdraft:-

Downdraft gasifiers (Figure 1) have a long history of use in cars and buses to produce a wood-derived gas for internal combustion engines. In a downdraft gasifier, air is introduced into a downward flowing packed bed or solid fuel stream and gas is drawn off at the bottom. The air/oxygen and fuel enter the reaction zone from above decomposing the combustion gases and burning most of the tars. As a result, a simple cooling and filtration process is all that is necessary to produce a gas suitable for an internal combustion engine. Downdraft gasifiers are not ideal for waste treatment because they typically require a low ash fuel such as wood, to avoid clogging. In addition, downdrafts have been difficult to scale up beyond 1MW because of the geometry of their throat section.

3.1.2 Incineration (combustion):-

The term 'incineration' is used to describe processes that combust waste and recover energy. In mass burning systems, the refuse is burned in an "as received" condition. Generally, in mass burning systems all of the waste entering the facility is dumped into a large storage pit, with bulky items being removed prior to entering the combustion chamber. To allow the combustion to take place a sufficient quantity of oxygen is required to fully oxidize the fuel. Incineration plant combustion temperatures are in excess of 850oC and the waste is mostly converted into carbon dioxide and water and any noncombustible materials (e.g. metals, glass, stones) remain as a solid, known as incinerator bottom ash (IBA) that always contains a small amount of residual carbon. The direct combustion of a waste usually releases more of the available energy compared to pyrolysis and gasification.

Necessary conditions for MSW incineration

The key requirements in the incineration of MSW are as follows:

A minimum combustion temperature of 850oC for 2 seconds of the resulting combustion products Specific emission limits for the release of SO2, NOx, HCl, volatile organic compounds (VOCs), CO, particulate (fly ash), heavy metals, dioxins, etc. to the atmosphere.

Bottom ash that is produced has a total organic carbon content of less than 3%.

INCINERATION PROCESS

An incinerator with energy recovery comprises of the following process:-

- Waste reception, Sorting, Preparation.
- Combustion.
- Energy Recovery Plant.
- Emission Control.
- Residue Handling.

CONCLUSION

Each and every healthcare facilities which generates biomedical waste, needs to set up requisite treatment facilities to ensure proper treatment of wastes and its disposal so as to minimize risk of exposure to staff, patients, doctors and the community from biomedical hazards. Safe and effective management of biomedical waste is not only a legal necessity but also a social responsibility.

Some suggestions are given below:

- BMW marked vehicles must be increased.
- Alternatives transport must be used to collect the waste in case the driver is not present or bad condition of vehicles.
- BMW vehicles should be covered properly to prevent the waste from leaking.
- BMW should not be mixed with other municipal waste.
- Colour code for BMW must be followed.
- Regular training programme should be organised for the staff.
- BMW Management Board must be established in each district.

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