# TREATMENT OF MEDICAL LABS LIQUID WASTES

**Submitted By**

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A thesis submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Sciences
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**2015**

# معالجة المخلفات السائلة لمعامل التحاليل الطبية


**رسالة مقدمة من الطالبة**

**سحر محمود السيد شيخون**

**بكالوريوس علوم (كيمياء) – كلية العلوم ــ جامعة عين شمس ــ 1995**

**دبلوم فى علوم البيئة ــ معهد الدراسات والبحوث البيئية ــ جامعة عين شمس ــ 2006**


**لاستكمال متطلبات الحصول علي درجة الماجستير**

**في العلوم البيئية**

**قسم العلوم الأساسية البيئية**

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APPROVAL SHEET

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**2015**

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| | |
|---|---|
| AOX | Adsorbable Organic halogens |
| A. U | Arbitrary Units |
| APHA | American Public Health Association |
| BOD | Biochemical Oxygen Demand |
| BMW | Biomedical waste |
| COD | Chemical Oxygen Demand |
| DNA | Deoxyribonucleic Acid |
| DO | Dissolved Oxygen |
| ELIZA | Enzyme Linked immunosorbent Assay |
| FDA | Food and Drug Administration |
| HBV | Hepatitis B virus |
| HBsAg | Hepatitis B surface Antigen |
| HCA | Hospital care activity |
| HCF | Hospital care facilities |
| HCV | Hepatitis C virus |
| HCW | Health care waste |
| HCWM | Health care waste management |

| | |
|---|---|
| HEV | Virus E |
| HW | Hospital waste |
| HWW | Hospital waste water |
| MSW | Medical Solid Waste |
| MW | Medical waste |
| MWTA | Medical waste tracking act |
| NIOSH | National institute for Occupational Safety And Healthy |
| NRMW | None regulated medical waste |
| OSHA | Occupational Safety and Health Administration |
| LDL | Low Disinfectant Level |
| Rel. Abs | Relative Absorbance |
| RMW | Regulated medical waste |
| PCR | Polymerase Chain Reaction |
| TOC | Total Organic Carbon |
| WM | Waste management |
| WWT | Waste water treatment |
| WWTM | Wastewater treatment management |

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## صفحة الموافقة على الرسالة

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# 1-INTRODUCTION

Medical waste (MW) can be classified into two types: general waste and special waste. Since general waste is not regulated or defined as hazardous or potentially dangerous wastes, it does not require special handling, treatment, and disposal (CEC, 1993; Hassel-Riis and Constantine, 1992). Therefore, it is sometimes called non-regulated medical waste (NRMW) (Waste- Tech and Konheim and Ketchham, 1991; Marrak, 1988).Special Waste includes materials considered to be potential health hazards, requiring special handling, treatment, and disposal, usually according to special regulations and guidelines such as Medical Waste tracking Act (MWTA). Special waste can include chemical waste, infectious waste, and radioactive waste (Kerdsuwan, 2000; Hasselriis and Constantine, 1992). Therefore, most of special waste is treated as regulated medical waste (RMW) (Davis, 2000; Hall, 1998).

MW is a threat to humans and other living things (Henry and Hienke, 1996). Consequently, infectious industrial WM and

pollution problems associated with infectious waste have attracted significant attention (LaGrega et al., 1994). The indiscriminant and unscientific management of BMW poses serious threats to human health and involves hazards and risks, not only for the generators and operators, but also for the general community (Sandhu and Singh, 2003). Moreover, hospital waste water can be 150 times more concentrated in micropollutants than urban effluents (Verlicchi et al., 2010). This could contribute towards explaining the presence of hospital pollutants not only WWT plants and their effluents (Brown et al., 2006; Langford and Thomas, 2009), but also in different compartments of the environment (surface water, groundwater, sediments, etc.) and (Santos et al., 2010), (Vazquez-Roig et al., 2012).

Unscientific disposal of HCW may lead to the transmission of communicable diseases such as gastro enteric infections, respiratory infections, spreading through air water, and direct human contact with the blood and infectious body fluids. These could be responsible for transmission of hepatitis B, C, E, and AIDS within the community. Health care professionals and the general public are at risk due to this. Diseases are spread by improper treatment and disposal of waste (Gujarat Pollution control Board, 2005). Legal provisions (BMW [management and

handling] Rules 1998) (Government of India 1998) exist to mitigate the impact of hazardous and infectious hospital waste on the community. However, these provisions are yet to be fully implementing dieted. The absence of proper WM, lack of awareness about the health hazards from BMWs, insufficient financial and human resources, and poor control of waste disposal are the most critical problems connected with HCW. The hazardous impact of MW on the public and environment is enhanced manifold if adequate and appropriate handling of these wastes is not adopted (Mathur et al., 2011).

Hospital and other healthcare establishments have a duty of care for public health, and have particular responsibilities in relation to the waste they produce e.g. BMW (Pruss et al., 19994). Negligence regarding BMWM significantly contributes to environmental pollution, affects the health of human beings, and depletes natural and financial resources (Henry and Heinke, 1996; Oweis et al., 2005). The impact of waste generated from the healthcare establishments on human health and the environment has often not been given significant attention from either the affected people or the concerned authorities (Gupta et al., 2009).