

**UNIVERSITI TEKNOLOGI MARA**

**EFFECT OF AERATION RATE  
ON OXYGEN TRANSFER  
FOR LEACHATE TREATMENT**

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Dissertation submitted in partial fulfillment of the requirements  
for the degree of  
**Master of Science**

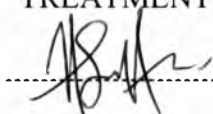
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## ABSTRACT

Aeration process provides oxygen in leachate treatment as the purposes of increasing the dissolved oxygen consumption and allocation in the leachate components for microorganisms, organic and inorganic elements. Even there are various level of aeration rate have been introduce towards leachate treatment, the optimum or the efficient level of aeration rate still not satisfactory. The problem is the selection of aeration rate is still not suitable towards effect of oxygen transfer in the leachate treatment. As the current designed and studies on aeration rate, the optimum level of controlling the contamination of DO, BOD and COD in the leachate still not fully achieve and comply with the leachate effluent quality standard. This is bad for leachate effluent quality and the austerity of energy consumption, which amount of designed aeration rate or oxygen distribution, are not suitable for a range of leachate quality treatment. This study is significance to obtain critical or optimum design or comprehensions towards enhance the level of aeration rate in the treatment. The current research focuses on the evolution of optimum aeration rate, so as to yield higher values of oxygen transfers and aeration efficiency by varying some of physical and chemical indicators towards selection of optimum aeration rate in leachate treatment. The objectives of this study are for attain those requirements, to determine optimum aeration rate for leachate treatment, to determine the effect of aeration rate on oxygen transfer in leachate and to determine the effect of aeration rate on the water quality of leachate. The optimum aeration rate in this study is R5 which is equal to  $= 1.40 \text{ kgO}_2/\text{kWh}$ . The standard oxygen transfer rate (SOTR) which is  $0.0349/\text{hour} \times 2.4119 \text{ mg/L} \times 5000 \text{ L} \times 60 \text{ min/hour} = 420.88 \text{ mg/h} = 0.420 \text{ kgO}_2/\text{h}$  and SOE (aeration efficiency) is then  $0.420 \text{ kg/h} \div 0.300 \text{ kW} = 1.40 \text{ kgO}_2/\text{kWh}$ . The effect of the aeration on oxygen transfer in leachate also has been determine which R5 has the highest percentages of dissolved oxygen value which is 30.91%, and has the highest removal of biochemical oxygen demand which is -19.73% and highest removal of chemical oxygen demands which is 19.32%. Meanwhile, R2 has the highest value of ammoniacal nitrogen removal which is -63.96%. In term of comparable with the standard, most of the chemical parameters almost reached the target but still not fully comply the authorize leachate effluent discharge standard.

## TABLE OF CONTENT

TITLE	PAGE
TITLE PAGE	
DECLARATION	i
ABSTRACT	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENT	iv
LIST OF FIGURES	v
LIST OF TABLE	viii
LIST OF ABBREVIATIONS	x
LIST OF NOMENCLATURE	xi
LIST OF APPENDICES	xii
CHAPTER	
1. INTRODUCTION	
1.1 Background of Study	1
1.2 Problem Statement	4
1.3 Objective of Study	5
1.4 Scope of Study	5
1.5 Significant of Study	6
2. LITERATURE REVIEW	
2.1 Introduction	7
2.2 Sanitary Landfills	7
2.2.1 Sanitary Landfills Dumpsites	8
2.2.2 Sequence Batch Reactor	10
2.3 Aeration Phase	12
2.3.1 Surface Aeration	13
2.3.2 Diffused Air Aeration System	15
2.4 Oxygen Transfer Components and Determination	17
2.4.1 Dissolved Oxygen (DO)	17

2.4.2 Biochemical Oxygen Demand (BOD)	18
2.4.3 Chemical Oxygen Demand (COD)	19
2.4.4 Ammoniacal Nitrogen, Nitrification	20
2.5 Leachate Effluent Discharge Standard	21
2.6 Aeration Rate and Oxygen Transfer Formulation	23
2.6.1 Non-Steady state method/Two Film Theory	23
2.7 Previous Study	24
3. METHODOLOGY	27
3.1 Introduction	27
3.2 Flow Chart	28
3.3 Site Background	29
3.4 Laboratory Experiment	31
3.4.1 Leachate Sampling	31
3.4.2 Aeration Process	33
3.5 Physical and Chemical Parameters Test	37
3.5.1 Sample Collection	37
3.5.2 Temperature and pH value	38
3.5.3 DO and BOD	38
3.5.4 COD	40
3.5.5 Chemical and Heavy Metal Test	40
3.6 Data Collection and Aeration Rate Analysis	42
3.7 Data Collection and Analysis	42
4. RESULT AND DISCUSSION	
4.1 Introduction	43
4.2 Initial Characteristics of Leachate Sampling	44
4.3 Result of Aerated Leachate	48
4.3.1 DO	60
4.3.2 BOD	62
4.3.3 COD	63
4.3.4 Ammoniacal Nitrogen	65
4.4 Aeration Efficiency	67