

DETERMINATION OF BIOCHEMICAL OXYGEN
DEMAND (BOD₅), CHEMICAL OXYGEN DEMAND
(COD) AND TOTAL AMMONIUM REMOVAL FROM
DOMESTIC WASTEWATER USING REED BED
FILTER WITH GRANULAR ACTIVATED CARBON

ONG KOK SENG

JABATAN SAINS KEJURUTERAAN
FAKULTI SAINS DAN TEKNOLOGI
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA

SESI 2002/2003

1100025068

LP 21 FST 3 2003



1100025068

Determination of biochemical oxygen demand (BOD5), chemical oxygen demand (COD) and total ammonium removal from domestic wastewater using reed bed filter with granular activated carbon / Ong Kok Seng



1100025068

PERPUSTAKAAN KOLEJ UNIVERSITI SAINS & TEKNOLOGI MALAYSIA (KUSTEM)			
Pengarang ONG KOK SENG		No. Panggilan dn 1658	
Judul Determination of biochemical oxygen		LP 21 FST	
Tarikh	Waktu Pemulangan	Nombor Ahli	Tanda tangan
11/12/04	7.40pm	PA 072	0J.
15/7/05	6-00pm	UK 8207	[Signature]

9/3/10

LP
21
FST
3
2003

“Saya akui bahawa saya telah membaca karya ini dan pada pandangan saya karya ini memadai dari segi skop dan kualiti untuk tujuan penganugerahan Ijazah Sarjana Muda Teknologi (Teknologi Alam Sekitar).”

Tandatangan : 

Penyelia I : Prof. Madya Ir. Ahmad Jusoh

Tarikh : 22 March 2003

**DETERMINATION OF BIOCHEMICAL OXYGEN DEMAND (BOD₅),
CHEMICAL OXYGEN DEMAND (COD) AND TOTAL AMMONIUM
REMOVAL FROM DOMESTIC WASTEWATER USING REED BED
FILTER WITH GRANULAR ACTIVATED CARBON**

ONG KOK SENG

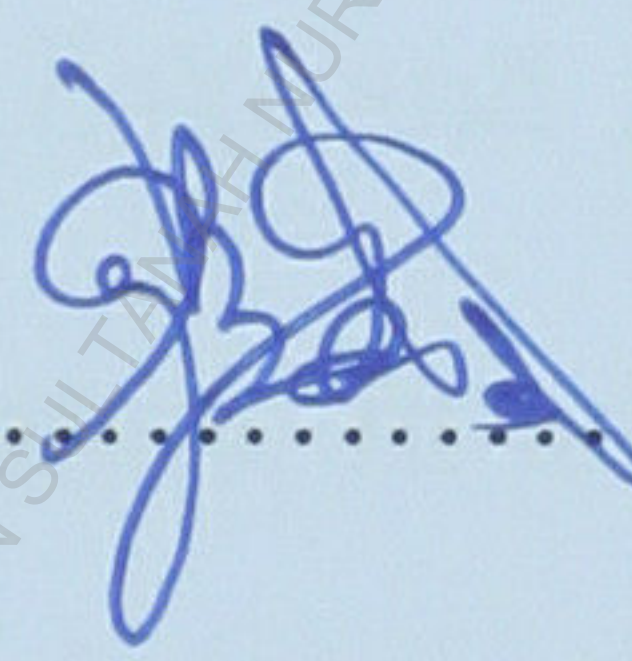
**This Project Is Submitted In Partial Fulfillment of The Requirements For The
Degree of Bachelor of Technology (Environmental Technology)**

**Fakulti Sains Dan Teknologi
Kolej Universiti Sains Dan Teknologi Malaysia**

MARCH, 2003

1100025068

“I declare that this thesis is the result of my own research except the materials as
cited in references”.

Signature : 

Name : Ong Kok Seng

Date : 22 March 2003

ACKNOWLEDGEMENTS

I would like to take this opportunity to extend many thanks to my supervisor Assoc. Prof. Ir. Ahmad Jusoh and Mr. Asmadi Ali as my project advisor for their valuable help, guidance and advice. Their generosity to spare their time throughout the course of this study was greatly appreciated too. Without their supervision, this study would not have been possible.

I am also particularly indebted to Mr. Zaki and Mr. Mohamad Mat Zin for their hospitality in giving me technical assistance. In addition, my gratitude also reaches out to all my classmates who provided valuable information and insight to this study.

My deepest gratitude goes to my family members especially my Dad and Mom for their endless love, concern and support along my days in the University.

Last but not the least, I would like to extend my greatest appreciation to my close friends Sunny Goh Eng Giap, Tam Yew Kong, Yeap Cheng Soon and Lim Saw Hooi in reaching out helping hand and virtuous aid. Further, my gratitude and thanks also go to Loh Ai Ling for her understanding and moral support throughout this study.

ABSTRACT

This study was conducted to determine the removal efficiency of biochemical oxygen demand (BOD₅), chemical oxygen demand (COD) and total ammonium from domestic wastewater by various combinations of reed bed filtration systems. Subsurface horizontal flow system was employed in this study. It occupied an area of 1.04 m² with a design flow at 0.1 ml/s, 1.0 ml/s and 3.0 ml/s. These filters comprised of two different filter media; fine gravel and medium gravel. The reed bed filters were planted with *Eicchornia crassipes*, which is locally known as water hyacinth. The influent and effluent of the domestic wastewater from these systems were examined to determine the BOD₅, COD and total ammonium removal efficiency for five consecutive days. The results indicated that the removal of all these chemical constituents using reed bed filter was greater than the unplanted bed filter. This research also revealed that the removal by using fine gravel reed bed filter was more efficiency than the medium gravel reed bed filter. Slower flow rate increased the efficiency of reed bed filter in removing these pollutants in the wastewater. Reed bed filter with GAC could remove up to 78.04% of BOD₅, 72.92% of COD and 95.58% of total ammonium from the wastewater. As a conclusion, reed bed filters have a great potential for the treatment of domestic wastewater and it is environmental friendly.

ABSTRAK

Kajian ini dijalankan untuk menentukan keberkesanan penyingkiran keperluan oksigen biokimia (BOD₅), keperluan oksigen kimia (COD) dan jumlah ammonium daripada air sisa domestik oleh pelbagai jenis kombinasi sistem penapis 'reed bed'. Sistem aliran bawah permukaan secara mendatar digunakan di dalam kajian ini. Kajian ini menggunakan kawasan seluas 1.04 m² dengan rekaan aliran pada kadar 0.1 ml/s, 1.0 ml/s dan 3.0 ml/s. Penapisan ini terdiri daripada dua jenis media yang berlainan; batu kelikir halus dan batu kelikir sederhana. Penapis 'reed bed' ini ditanam dengan *Eicchornia crassipes* yang dikenali sebagai keladi bunting. Influen dan efluen air sisa domestik daripada sistem penapis ini dianalisis untuk menentukan kecekapan penyingkiran BOD₅, COD dan jumlah ammonium selama lima hari berturut-turut. Keputusan menunjukkan bahawa penyingkiran semua jujuk-jujuk kimia ini dengan penapis 'reed bed' adalah lebih cekap daripada penapis tanpa tumbuhan. Kajian ini juga menunjukkan bahawa penyingkiran dengan menggunakan penapis 'reed bed' berbatu kelikir halus lebih cekap daripada penapis 'reed bed' berbatu kelikir sederhana. Kadar alir yang lebih rendah dapat meningkatkan keberkesanan penapis 'reed bed' dalam menyingkirkan bahan pencemar ini di dalam air sisa. Penapis 'reed bed' dengan GAC dapat mencapai kecekapan sehingga 78.04% BOD₅, 72.92% COD dan 95.58% jumlah ammonium. Secara kesimpulannya, penapis 'reed bed' berpotensi dalam merawat air sisa domestik dan ia merupakan sistem rawatan secara semulajadi.