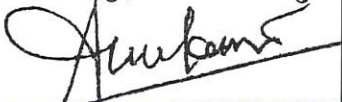


**FAKULTI : FAKULTI KEJURUTERAAN AWAM**  
**TAJUK : PERMOHONAN PELANJUTAN NOTIS HANTAR TESIS**

8.4

BUTIRAN PELAJAR	KETERANGAN PELAJAR	ULASAN DAN TINDAKAN FAKULTI	KELULUSAN																											
<p><b>NAMA : OOI THEAM YIEW</b></p> <p><b>NO K/P @ ISID : 900605025475</b></p> <p><b>NO MATRIK : MKA143018</b></p> <p><b>PROGRAM : SARJANA FALSAFAH (PERSEKITARAN)</b></p> <p><b>JENIS PENGAJIAN : PENYELIDIKAN</b></p> <p><b>BENTUK PENDAFTARAN : SEPENUH MASA</b></p> <p><b>PENYELIA : PROF. MADYA DR. MOHD FADHIL BIN MD. DIN</b></p> <p><b>BIL SEM: 7/8</b></p> <p><b>STATUS : AKTIF</b></p> <p><b>MUKASURAT : 1/1</b></p>	<p>1.1 Notis Hantar Tesis pelajar telah diperakukan pada Mesyuarat JAPSU pada 26 Jan 2017</p> <p>1.2</p> <table border="1"> <thead> <tr> <th>Bil</th> <th>Nama Calon Pemeriksa Dalam</th> <th>Perakuan JAPSU</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Prof. Madya Dr. Johan bin Sohaili</td> <td>Dilantik</td> </tr> <tr> <td>2</td> <td>Prof. Madya Dr. Zainura binti Zainon Noor</td> <td>Gantian</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Bil</th> <th>Nama Calon Pemeriksa Luar</th> <th>Perakuan JAPSU</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Prof. Madya Dr. Ramlah Mohd Tajuddin (UiTM)</td> <td>Dilantik</td> </tr> <tr> <td>2</td> <td>Prof. Dr. Azni Idris (UPM)</td> <td>Gantian</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Bil</th> <th>Nama Calon Pengerusi</th> <th>Perakuan JAPSU</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Prof. Madya Dr. Khalida binti Muda</td> <td>Dilantik</td> </tr> <tr> <td>2</td> <td>Prof. Madya Dr. Kamarudin bin Hj. Ahmad</td> <td>Gantian</td> </tr> </tbody> </table>	Bil	Nama Calon Pemeriksa Dalam	Perakuan JAPSU	1	Prof. Madya Dr. Johan bin Sohaili	Dilantik	2	Prof. Madya Dr. Zainura binti Zainon Noor	Gantian	Bil	Nama Calon Pemeriksa Luar	Perakuan JAPSU	1	Prof. Madya Dr. Ramlah Mohd Tajuddin (UiTM)	Dilantik	2	Prof. Dr. Azni Idris (UPM)	Gantian	Bil	Nama Calon Pengerusi	Perakuan JAPSU	1	Prof. Madya Dr. Khalida binti Muda	Dilantik	2	Prof. Madya Dr. Kamarudin bin Hj. Ahmad	Gantian	<p>1.1 Pelajar telah memohon untuk pembaharuan notis dan mengekalkan panel lantikan sebelum ini yang telah mendapat sokongan dari penyelia dan fakulti.</p> <p>1.2 Dokumen seperti dilampirkan</p>	<p>Disokong / Tidak disokong</p> <p></p> <p><b>PROFESOR DR. KHAIRUL ANJAR KASSIM</b>  Dekan/ID (Akademik)  &amp; Cop Rasmi  Fakulti Kejuruteraan Awam  Universiti Teknologi Malaysia  81310 UTM Johor Bahru, Johor</p> <p>Tarikh : _____</p> <p>Setuju / Tidak Setuju (Ulasan)</p> <p>_____</p> <p>_____</p> <p>_____</p> <p><b>Pengerusi Mesyuarat Jawatankuasa Akademik Pengajian Siswazah Universiti (JAPSU) &amp; Cop Rasmi</b></p> <p>Tarikh : _____</p>
Bil	Nama Calon Pemeriksa Dalam	Perakuan JAPSU																												
1	Prof. Madya Dr. Johan bin Sohaili	Dilantik																												
2	Prof. Madya Dr. Zainura binti Zainon Noor	Gantian																												
Bil	Nama Calon Pemeriksa Luar	Perakuan JAPSU																												
1	Prof. Madya Dr. Ramlah Mohd Tajuddin (UiTM)	Dilantik																												
2	Prof. Dr. Azni Idris (UPM)	Gantian																												
Bil	Nama Calon Pengerusi	Perakuan JAPSU																												
1	Prof. Madya Dr. Khalida binti Muda	Dilantik																												
2	Prof. Madya Dr. Kamarudin bin Hj. Ahmad	Gantian																												

20/112018

017-4683450

22<sup>nd</sup> April 2018

Postgraduate Office of Civil Engineering  
Universiti Teknologi Malaysia,  
81310 Johor Bahru, Johor  
Malaysia



Dear Sir/Madam,

I, Ooi Theam Yiew (Matric No. MKA143018) would like to apply for extension of my **Notification to Submit a Thesis and Nomination of Examiners**. My thesis has been completed and will be submitted within this semester. In regarding for the panels I would like to keep my panels without changes. I hope the faculty can approved my application for extension.

Thank you.

Verified by,

A handwritten signature in black ink, consisting of a large, stylized 'S' shape with a horizontal line crossing it.

ASSOC. PROF. IR. DR. MOHD FADHIL BIN MD DIN  
Director  
UTM-Campus Sustainability (UTM-CS)  
Office of Deputy Vice-Chancellor (Development)  
Universiti Teknologi Malaysia  
81310 Johor Bahru, Johor

Perakuan Pemeriksa Tesis  
Certificate of Thesis Examiners

**SEKOLAH PENGAJIAN SISWAZAH**  
**SCHOOL OF GRADUATE STUDIES**

BIL: 4/2005/2006 TARIKH: 28 DECEMBER 2016

Nama Pelajar Student Name	Pemeriksa Examiner		Perakuan Fakulti Faculty Certificate		Pengerusi Viva Viva Chairman
	Calon PD IE Candidates	Calon PL EE Candidates	PD IE	PL EE	
<p><b>STUDENT NAME</b> OOI THEAM YIEW</p> <p><b>FACULTY</b> FAKULTI KEJURUTERAAN AWAM</p> <p><b>MATRIC NO. &amp; IC NO.</b> MKA143018 / 900605025475</p> <p><b>SUPERVISOR NAME</b></p> <ol style="list-style-type: none"> <li>1. PROF MADYA DR MOHD. FADHIL BIN MD DIN (PENYELIA UTAMA)</li> <li>2. DR. YONG EE LING (BERSAMA)</li> </ol> <p><b>TITLE OF RESEARCH</b> RECOVERY OF ALUMINIUM FROM WATER TREATMENT SLUDGE AS HEAT REFLECTANCE AGENT</p>	<p>DR. JOHAN BIN SOHAILI (PEJABAT TIMBALAN NAIB CANSOLOR (PEMBANGUNAN))</p> <hr/> <p>PROF. MADYA DR. ZAINURA BINTI ZAINON NOOR (FAKULTI KEJURUTERAAN KIMIA DAN KEJURUTERAAN TENAGA)</p> <hr/> <p>DR. SHAZWIN BINTI MAT TAIB (FAKULTI KEJURUTERAAN AWAM)</p>	<p>DR. DR. FARRAH AINI DAHALAN (UNIVERSITI MALAYSIA PERLIS)</p> <hr/> <p>PROF. MADYA DR. RAMLAH MOHD TAJUDDIN (UNIVERSITI TEKNOLOGI MARA (UITM))</p> <hr/> <p>PROF. DR. AZNI BIN IDRIS (UNIVERSITI PUTRA MALAYSIA (UPM))</p>	<p>(RECOMMENDED I) DR. JOHAN BIN SOHAILI (PEJABAT TIMBALAN NAIB CANSOLOR (PEMBANGUNAN))</p> <p><b>REMARKS :</b></p> <p>(SUBSTITUTE RECOMMENDED) PROF. MADYA DR. ZAINURA BINTI ZAINON NOOR (FAKULTI KEJURUTERAAN KIMIA DAN KEJURUTERAAN TENAGA)</p> <p><b>REMARKS :</b></p>	<p>(RECOMMENDED I) PROF. MADYA DR. RAMLAH MOHD TAJUDDIN (UNIVERSITI TEKNOLOGI MARA (UITM))</p> <p><b>REMARKS :</b></p> <p>(SUBSTITUTE RECOMMENDED) PROF. DR. AZNI BIN IDRIS (UNIVERSITI PUTRA MALAYSIA (UPM))</p> <p><b>REMARKS :</b></p>	<p><b>CHAIRMAN</b> PROF. MADYA DR. KHALIDA BINTI MUDA</p> <p><b>SUBSTITUTE</b> PROF. MADYA DR. KAMARUDIN BIN HJ AHMAD</p> <p><b>CHAIRPERSON ASSISTANT</b></p>

— 03-55435123

— 018-9568034



**KEPUTUSAN MESYUARAT  
ADHOC JKAPG  
PENCALONAN PANEL  
PEMERIKSA**

No. Dokumen : FKA.B.PPL.ADHOC  
 Tarikh Kuatkuasa : 1 September 2016  
 Tarikh Semakan : 2 November 2016  
 Edisi : 01  
 No. Semakan : 00

**TARIKH : 11 JANUARI 2017**

Nama Pelajar	:	Ooi Theam Yiew
Tajuk Penyelidikan	:	Recovery Of Aluminium From Water Treatment Sludge As Heat Reflectance Agent
Penyelia	:	1. Prof Madya Dr Mohd. Fadhil Bin Md Din (Penyelia Utama) 2. Dr. Yong Ee Ling (Bersama)
Program Pengajian	:	Sarjana Kejuruteraan (Alam Sekitar)

**Calon Pemeriksa Dalam :**

- 1) Prof. Madya Dr. Johan Bin Sohaili
- 2) Prof. Madya Dr. Zainura Binti Zainon Noor, FKT
- 3) Dr. Shazwin Binti Mat Taib

**KEPUTUSAN**

1

2

3

**Calon Pemeriksa Luar :**

- 1) Dr. Farrah Aini Binti Dahalan, UNIMAP
- 2) Prof. Madya Dr. Ramlah Binti Mohd Tajuddin, UiTM
- 3) Prof. Dr. Azni Bin Idris, UPM

**KEPUTUSAN**

3

1

2

**Pencalonan Pengerusi :**

- 1) Prof. Ros Pm Dr. Khalida
- 2) Pm Dr. Kamarudin

**Pembantu Pengerusi**

- 1) —

Catitan :

BIL	NAMA	TANDATANGAN
1	PENGERUSI JKAPG/WAKIL	wakil PAPS
2	WAKIL PROF.	Wakil
3	PENGURUS AKADEMIK PENGAJIAN SISWAZAH	[Signature]
4	KETUA JABATAN STRUKTUR DAN BAHAN/WAKIL	[Signature]
5	KETUA JABATAN HIDRAUL & HIDROLOGI/WAKIL	TH
6	KETUA JABATAN GEOTEKNIK DAN PENGANGKUTAN/WAKIL	[Signature]
7	KETUA JABATAN ALAM SEKITAR/WAKIL	[Signature]

**SEKOLAH PENGAJIAN SISWAZAH  
UNIVERSITI TEKNOLOGI MALAYSIA**

**NOTIS UNTUK MENGHANTAR TESIS DAN PENCALONAN PANEL PEMERIKSA  
(NOTIFICATION TO SUBMIT A THESIS & NOMINATION OF EXAMINERS)**

Borang ini perlu diisi selewat-lewatnya tiga (3) bulan sebelum tarikh jangkaan menghantar tesis.  
*This form needs to be submitted at least three (3) months before the expected date of submission.*

**BAHAGIAN A** - Diisi oleh pelajar [*To be completed by the candidate*]

1. Nama Pelajar

*Name of Candidate*

**OOI THEAM YIEW**

2. No. Kad

Pengenalan  
*IC No./Passport  
No.*

**900605025475**

No. Matrik

Pelajar  
*Student No.*

**MKA143018**

3. Jabatan & Fakulti

*Department &  
Faculty*

**FACULTY OF CIVIL  
ENGINEERING**

Dihubungi  
*Contact*

**0174683450**

4. Program Pengajian

*Programme of  
Study*

**MKAUA3AJA - MASTER OF PHILOSOPHY**

5. Alamat surat-  
menyurat

*Mailing Address*

**NO 99 FASA 1-C TAMAN SETIA,  
JALAN KILANG TEBU,  
05050,ALOR SETAR  
KEDAH,MALAYSIA**

6. Nama

Penyelia/Pengerusi  
Panel Penyelia  
*Name of  
Supervisor (s)*

**1. PROF MADYA DR MOHD. FADHIL BIN MD DIN (PENYELIA  
UTAMA) - mfadhil@utm.my  
2. DR. YONG EE LING (BERSAMA) - eeling@utm.my**

7. Cadangan Tajuk Tesis Dalam Bahasa Melayu dan Bahasa Inggeris (setelah dipersetujui oleh  
Penyelia)

*Proposed title of thesis in Malay and English as agreed by the Supervisor*

**RECOVERY OF ALUMINIUM FROM WATER TREATMENT SLUDGE AS HEAT  
REFLECTANCE AGENT**

8. Tarikh jangkaan tesis dihantar

*Expected date of submission*

**15 APRIL 2017**

## RECOVERY OF ALUMINIUM FROM WATER TREATMENT SLUDGE USING LEACHING PROCESS

### ABSTRACT

Vast quantities of sludge production from water treatment plants have accumulated over the years. A water treatment plant in Semangar, Kota Tinggi Johor generated an estimated amount of 80 tonnes of dried sludge per year. The common options for managing water treatment sludge such as disposed by land applications or landfills are not suitable as it caused various environmental problems. This issue has encouraged many researchers to conduct research with major emphasis placed on reusing or recycling of water treatment sludge. The purpose of this study is reuse the water treatment sludge as a resource for recovering aluminium. Leaching process was used to recover the aluminium with sulphuric acid as the acid reagent and optimization was conducted to obtain the optimum leaching condition. The effects of acid concentration, solid to liquid ratio, temperature and heating time on the aluminium recovery were studied to determine the suitable range of parameters for the optimization process. The optimization was conducted using Response Surface Methodology with Central Composite Design to obtain an optimum leaching condition for the aluminium recovery from water treatment sludge. The recovered aluminium was characterized in terms of mineral phase, element composition, morphology and solar reflectance. It was discovered that the aluminium recovery increased with an increase in temperature and heating time, while the effects of acid concentration and solid to liquid ratio on the aluminium recovery does not shows any consistent trend. The optimum leaching condition obtained was found to be 4 M of acid concentration, 18.46 % solid to liquid ratio, 90 °C and 4.08 hour. Conducting leaching process under such condition yield an aluminium recovery rate of 69.83 %, a value that reasonably close to the predicted value from the optimization process.

**Keywords:** Water treatment sludge; Aluminium; Leaching; Response surface methodology; Aluminium recovery

**BAHAGIAN B** - Diisi oleh Penyelia atau Pengerusi Panel Penyelia [*To be completed by the Supervisor (s)*]

1. Nama Penyelia/Penyelia Panel Penyelia \*  
*Name of Supervisor (s) \**

**PROF MADYA DR MOHD. FADHIL BIN MD DIN - mfadhil@utm.my**

2. Jabatan & Fakulti \*  
*Department & Faculty \**

**PEJABAT PELESTARIAN KAMPUS  
PEJABAT TIMBALAN NAIB CANSOLOR (PEMBANGUNAN)**

3. Di bawah ini dicalonkan mana-mana Pemeriksa Dalam dan Pemeriksa Luar untuk tindakan Pusat Pengajian Siswazah:  
*I/We nominate the following candidates to six as the internal and external examiners*

- (i). Calon PEMERIKSA DALAM  
*Candidates for the INTERNAL EXAMINER*

<b>Nama Name</b>	<b>Jawatan Position</b>	<b>Alamat Address</b>	<b>Kepakaran Expertise</b>	<b>CV</b>
<u>JOHAN BIN SOHAILI</u>	DR.	FAKULTI KEJURUTERAAN AWAM	ENVIRONMENTAL ENGINEERING	<u>Johan Sohaili.pdf</u>
<u>ZAINURA BINTI ZAINON NOOR</u>	PROF. MADYA DR.	FAKULTI KEJURUTERAAN KIMIA DAN KEJURUTERAAN TENAGA	SOLID WASTE	<u>Doc1.doc</u>
<u>SHAZWIN BINTI MAT TAIB</u>	DR.	FAKULTI KEJURUTERAAN AWAM	DEVELOPMENT SCIENCE	<u>Dr. Shazwindocx.pdf</u>

- (ii). Calon PEMERIKSA LUAR  
Candidates for the EXTERNAL EXAMINER

<b>Nama Name</b>	<b>Jawatan Position</b>	<b>Alamat Address</b>	<b>Kepakaran Expertise</b>	<b>CV</b>
<u>DR. FARRAH AINI DAHALAN</u>	DR.	UNIVERSITI MALAYSIA PERLIS	ENVIRONMENTALENGINEERING	<u>FARRAH AINI CV.PDF</u>
<u>RAMLAH MOHD TAJUDDIN</u>	PROF. MADYA DR.	UNIVERSITI TEKNOLOGI MARA (UITM)	ENVIRONMENTAL ENGINNERING	<u>RAMLAH MOHD TAJUDDIN CV.PDF</u>
<u>AZNI BIN IDRIS</u>	PROF. DR.	UNIVERSITI PUTRA MALAYSIA (UPM)	ENVIRONMENTAL MANAGEMENT AND AEROBIC AND ANAEROBIC TREATMENT OF ORGANIC WASTES. BIOFILM PROCESSES FOR WASTE TREATMENT INCLUDING BIOFILTER, FLUIDIZED BED REACTORS. TOXIC SLUDGE TREATMENT FOR RECOVERY AND REUSE. SEWAGE SLUDGE TREATMENT FOR DISPOSAL.	<u>CV PROF. DR. AZNI BIN IDRIS.PDF</u>

4. Ulasan Penyelia/Pengerusi Panel Penyelia untuk menyokong pencalonan  
*Comment by the Supervisor (s) to support the nomination*
5. Perakuan penyelia  
*Declaration by Supervisor*
- i. Saya telah memaklumkan kepada semua calon pemeriksa berkenaan.  
*I have informed all the nominated examiners about their nominations*
  - ii. Pada pengetahuan saya, pemeriksa yang dicadangkan adalah memenuhi dokumen Panduan Lantikan dan Tanggungjawab Pemeriksa.  
*To my knowledge the nominated examiners are accordance to the document on Panduan Lantikan dan Tanggungjawab Pemeriksa*

**PROF MADYA DR MOHD. FADHIL BIN MD DIN**  
**PEJABAT TIMBALAN NAIB CANSOLOR (PEMBANGUNAN)**  
*Perakuan Acknowledgment*

**08 JANUARY 2017**  
*Tarikh Date*

**BAHAGIAN C** - Pengesahan oleh Jawatankuasa Pengajian Siswazah Fakulti [*Confirmation by the Faculty Graduate Committee*]

A) Nama Pengerusi Sesi Viva  
*Name of chair person for the viva session*

**PROF. MADYA DR. KHALIDA BINTI MUDA - khalida@utm.my**

Nama Pengerusi Gantian  
*Name of substitution chairperson for the viva session*

**PROF. MADYA DR. KAMARUDIN BIN HJ AHMAD - kamarudin@utm.my**

Nama Pembantu Pengerusi  
*Name of assistant chairperson for the viva session*

\* Pengerusi Sesi Viva akan dilantik oleh Fakulti  
*The Chairperson will be appoint by faculty*

B) Nama Pemeriksa Dalam I  
*Name of Internal Examiner I*

**DR. JOHAN BIN SOHALI**

Nama Pemeriksa Dalam II  
*Name of Internal Examiner II*

Nama Pemeriksa Dalam Gantian  
*Name of Internal Replacement Examiner*

**PROF. MADYA DR. ZAINURA BINTI ZAINON NOOR**

Nama Pemeriksa Luar I  
*Name of External Examiner I*

**PROF. MADYA DR. RAMLAH MOHD TAJUDDIN**

Nama Pemeriksa Luar II  
*Name of External Examiner II*

Nama Pemeriksa Luar Gantian  
*Name of External Replacement Examiner*

**PROF. DR. AZNI BIN IDRIS**

Disahkan oleh *Confirmation by*

**PROF. MADYA DR. MOHD ROSLI BIN HAININ**

**TIMBALAN DEKAN**

**FAKULTI KEJURUTERAAN AWAM**

Pengerusi Jawatankuasa Pengajian Siswazah Fakulti *Chairman of Faculty Graduate Committee*

Tarikh *Date* **13 JANUARY 2017**

Print

Close