

STUDY ON REMOVAL OF DYE USING GRANULAR ACTIVATED
CARBON

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KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA

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sn 1664

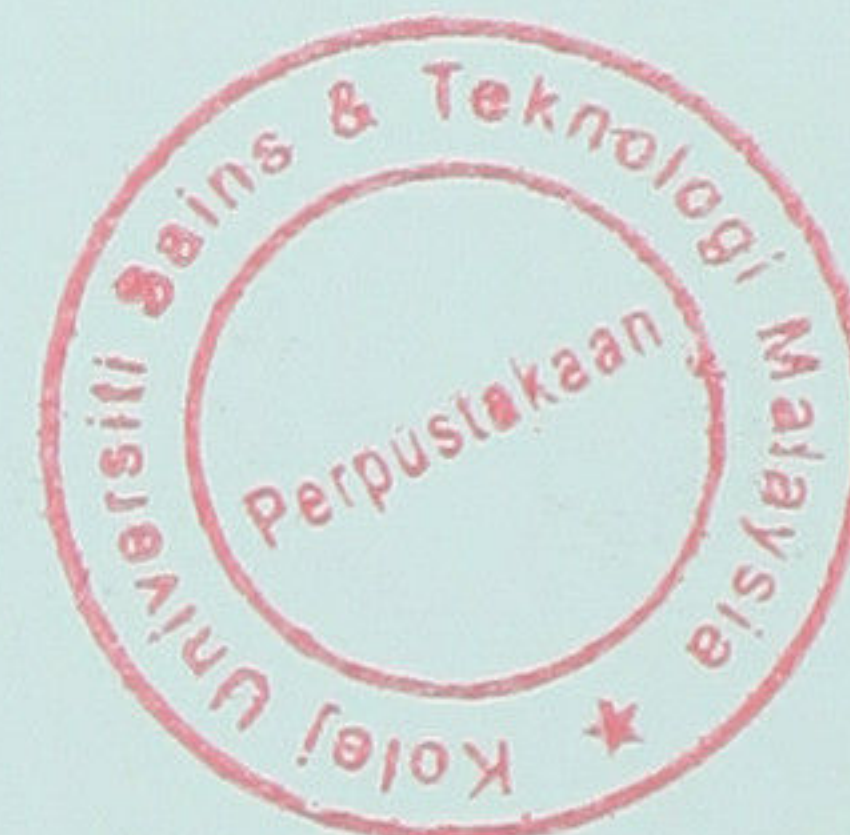
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Study on removal of dye using granular activated carbon / Tam Yew Kong.



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**KOLEJ UNIVERSITI SAINS & TEKNOLOGI MALAYSIA
 (KUSTEM)** *sn 1664*


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Judul STUDY ON REMOVAL OF DYE		FST 13 2003	
Tarikh	Waktu Pemulangan	Nombor Ahli	Tanda tangan
26/8/04	1.15 tgl	Ue7581	<i>[Signature]</i>
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28/3/05	4.45 pm	Ue6580	<i>[Signature]</i>
31/7/06	1/15 am	8590	<i>[Signature]</i>

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“Kami akui bahawa kami telah membaca karya ini dan pada pandangan kami karya ini adalah memadai dari segi skop dan kualiti untuk tujuan penganugerahan ijazah Sarjana Muda Teknologi (Teknologi Alam Sekitar).”

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Tarikh : 16-3-2003

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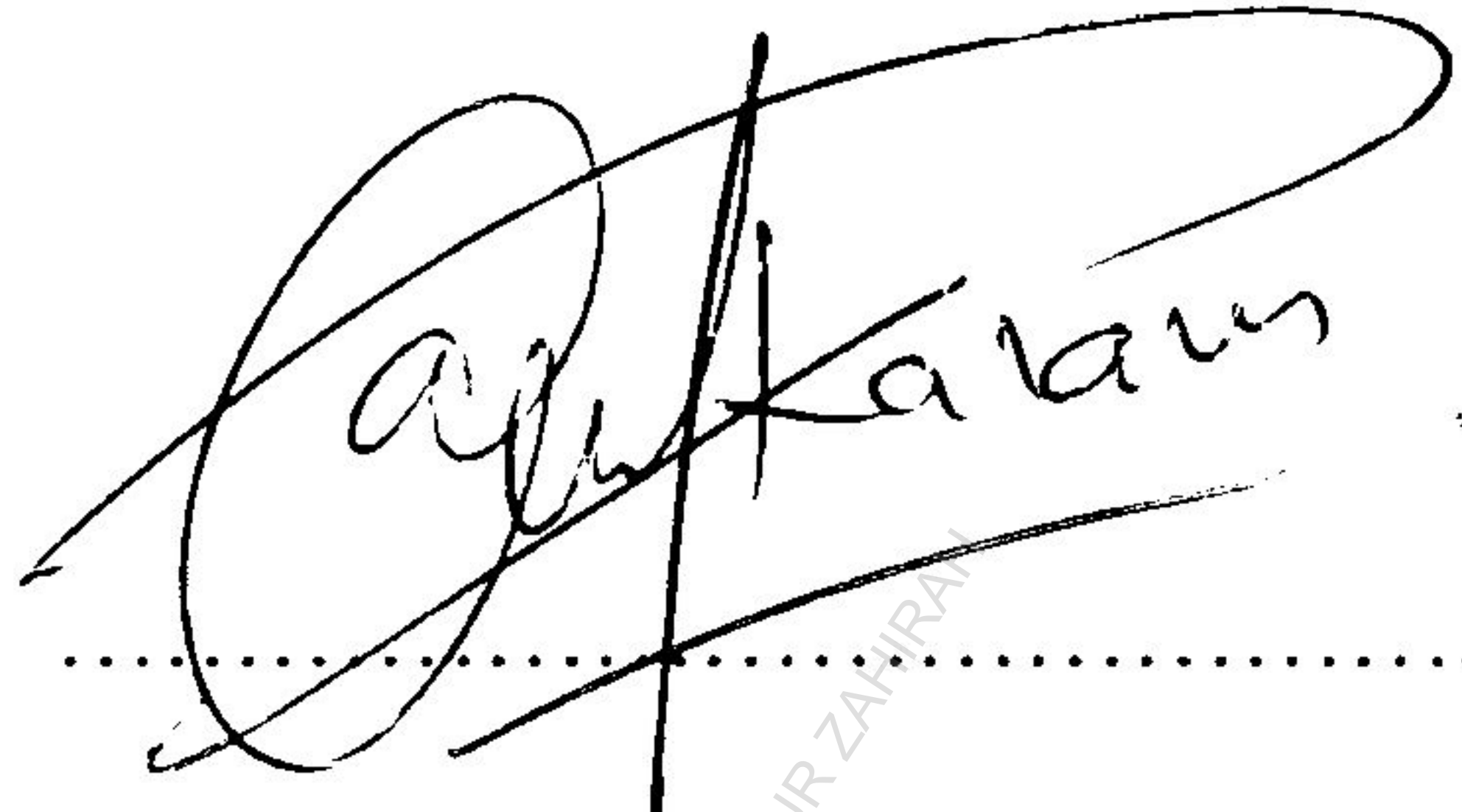
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“I declare that this thesis is the result of my own research except the materials as cited in the references”.

Signature : 
Author : Tam Yew Kong
Date : 16-3-2003

PERPUSTAKAAN SULTAN NUR ZAHARA

To my beloved parents and family members.

PERPUSTAKAAN SULTANAH NUR ZAHIRAH

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ABSTRACT

A study was carried out to investigate the effectiveness of granular activated carbon to remove colour caused by dyes. Three colours of dye used in this study were Red 3BS, Yellow FG, and Blue R dye. The results from the batch test shows Langmuir adsorption isotherm fitted the experimental data better than Freundlich adsorption isotherm. Correlation coefficients (R^2) obtained for Langmuir adsorption isotherm were more than 0.88, while the correlation coefficient for Freundlich adsorption isotherm were between 0.72 – 0.87. The Blue R dye had the highest adsorption capacity followed by Yellow FG and Red 3BS dyes onto granular activated carbon. In addition, granular activated carbon and dye were found to be chemical bonded where chemisorption occurred. Fixed bed columns were carried out with empty bed contact time (EBCT) ranging from 3.85 – 47.51 minutes to evaluate the column performance. The Adam-Bohart breakthrough equation was used to predict breakthrough curve and found to fit the experimental data well. The root mean square error that were calculated shows lower EBCT deviates more from the Adam-Bohart equation than higher EBCT.

ABSTRAK

Kajian telah dijalankan untuk mengkaji keberkesanan karbon teraktif untuk menyingkirkan warna disebabkan oleh dye. Dalam kajian yang dijalankan, tiga jenis dye digunakan iaitu Red 3BS, Yellow FG, dan Blue R. Ujikaji keseimbangan yang telah dijalankan menunjukkan data yang diperolehi daripada ujikaji ini lebih memuaskan persamaan isoterma Langmuir berbanding persamaan isoterma Freundlich. Pemalar korelasi (R^2) yang diperolehi untuk persamaan isoterma Langmuir adalah lebih daripada 0.88 manakala untuk persamaan isoterma Freundlich adalah dalam julat 0.72 – 0.87. Selain itu, didapati karbon teraktif menjerap dye Blue R dengan paling banyak diikuti oleh dye Yellow FG dan Red 3BS. Didapati juga ikatan yang terbentuk antara karbon teraktif dengan dye yang terjerap adalah ikatan kimia. Dalam ujikaji turus media tetap, masa sentuhan atau EBCT yang digunakan adalah dalam julat 3.85 – 47.51 minit untuk mengkaji kesan tersebut ke atas penjerapan oleh karbon teraktif. Persamaan Adam-Bohart digunakan untuk meramalkan lengkung penembusan dan didapati ramalan oleh persamaan ini memuaskan. “Root mean square error” atau RMSE digunakan untuk menentukan kejituan ramalan menggunakan persamaan Adam-Bohart. Didapati nilai RMSE yang dikira adalah lebih besar untuk EBCT yang rendah berbanding RMSE yang dikira untuk EBCT yang tinggi.