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Adsorption of carbon monoxide and nitric oxide from palm shell burning onto coal based activated carbon / Sharmeela Maira Khairul.

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ADSORPTION OF CARBON MONOXIDE AND NITRIC OXIDE FROM PALM SHELL BURNING ONTO COAL BASED ACTIVATED CARBON

SHARMEELA MAIRA BINTI KHAIRUL

FAKULTI SAINS DAN TEKNOLOGI
UNIVERSITI MALAYSIA TERENGGANU
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By

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Research Report submitted in partial fulfillment of
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Disahkan oleh: /Verified by:

.....

Penyelia Utama/*Main Supervisor*

Nama: DR. MARZUKI HJ. ISMAIL

Cop Rasmi: Pensyarah
Jabatan Sains Kejuruteraan
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu.

Tarikh: 24/5/07

.....

Penyelia Kedua (jika ada)/*Co-Supervisor (if applicable)*

Nama:

Cop Rasmi

Tarikh: .....

.....

Ketua Jabatan Sains Kejuruteraan/*Head, Department of Engineering Sciences*

Nama: DR. NORA'AINI BINTI ALI

Cop Rasmi: Ketua
Jabatan Sains Kejuruteraan
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Tarikh: 24/5/07

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LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation / Symbol	Description
^{o}C	Degree Celsius
CO	Carbon Monoxide
GAC	Granular Activated Carbon
H_2S	Hydrogen sulfide
NO_x	Nitrogen Oxide
NO_2	Nitrogen Dioxide
ppm	parts per million
PM	Particulate Matters
SEM	Scanning Electron Microscopy
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
SO_x	Sulphur Oxides
SO_2	Sulphur Dioxide
SPM	Suspended Particulate Matter
VOC	Volatile Organic Compound
L/min	Liter per minute

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N	Graph of Percentage Reduction of NO against Time (min)

ABSTRACT

The main objective of this study is to fabricate an alternative and economical unit for the removal of ambient air pollutants, which are CO and NO from the burning of palm oil waste. Through this study as well, the correlation between the efficiency of the activated carbon in removing the pollutants and the flowrates were determined. Moreover, palm oils have emerged as one of the most important oils in the world's oils and the market of fats. About 90% of palm oil is used as food related products worldwide, and the other 10% is used for basic raw material for soap. Fibers and shells are the main wastes generated from the palm oil processes. Through this study, the concentration of CO and NO were reduced through the adsorption process using coal-based activated carbon. Readings for the concentrations of CO and NO were taken before and after the smoke goes through the activated carbon column at the flowrate of 1 L/min. The concentrations of CO and NO readings from the inlet and outlet were repeated at the flowrates of 2.0 L/min, 3.0 L/min and 4.0 L/min for seven times with 30 readings each. The use of coal-based activated carbon could efficiently remove up to 71.6488% of CO and 47.3567% of NO. As a conclusion, the coal-based activated carbon has shown potential in removing CO and NO which is emitted from the burning of palm shells and fiber.

ABSTRAK

Objektif utama kajian ini adalah untuk mehasilkan suatu unit alternatif dan murah untuk penyingkiran gas pencemar udara ke persekitaran iaitu CO dan NO yang terhasil daripada pembakaran sisa pepejal kelapa sawit. Melalui kajian ini juga, perhubungan di antara keberkesanan karbon teraktif dalam penyingkiran gas pencemar dengan halaju kadar alir juga telah ditentukan. Kelapa sawit juga telah muncul sebagai salah satu minyak yang penting di pasaran dunia minyak dan lemak. Lebih kurang 90% minyak kelapa sawit digunakan untuk produk penghasilan makanan dan 10% untuk bahan asas pembuatan sabun. Tempurung dan sabut adalah sisa utama yang terhasil daripada proses penghasilan produk kelapa sawit. Menerusi kajian ini, kepekatan CO dan NO akan dapat dikurangkan melalui proses penyerapan menggunakan karbon teraktif yang dihasilkan daripada arang.. Bacaan kepekatan kandungan CO dan NO diambil sebelum dan selepas pembakaran melalui tiub karbon teraktif, pada kadar alir 1 L/min. Pengambilan bacaan kepekatan kandungan CO dan NO diulangi pada kelajuan kadar alir pada 2 L/min, 3 L/min, dan 4 L/min sebanyak 30 bacaan dan diulangi sebanyak 7 kali. Penggunaan karbon teraktif berasaskan arang dapat mencapai kecekapan penyingkiran sebanyak 71.6488% untuk CO dan 47.3567% untuk NO. Kesimpulannya, karbon teraktif berasaskan arang berpotensi untuk menapis gas pencemar yang dibebaskan daripada proses pembakaran sisa kelapa sawit.