

THE EFFECT OF PRICE LEVEL AND GROSS RATE
OF RISE AND FALL ON THE EQUATION

UNIVERSITY OF CALIFORNIA

UNIVERSITY OF CALIFORNIA
LIBRARY

THE EFFECT OF TEMPERATURE AND SHEAR RATE TO PURE
AND BLENDED OIL VISCOSITY

By

Amirrul Asyraf Bin Bakhari

Research report submitted in partial fulfillment of
The requirements for the degree of
Bachelor of Technology (Environmental)

Engineering Science Department
Faculty of Science and Technology
UNIVERSITI MALAYSIA TERENGGANU
2007

1100051071



**JABATAN SAINS KEJURUTERAAN
FAKULTI SAINS DAN TEKNOLOGI
UNIVERSITI MALAYSIA TERENGGANU**

**PENGAKUAN DAN PENGESAHAN LAPORAN
PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: THE EFFECT OF TEMPERATURE AND SHEAR RATE TO PURE AND BLENDED OIL VISCOSITY oleh Amirrul Asyraf Bin Bakhari. No.Matrik UK8982 telah diperiksa dan semua pembedaan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Kejuruteraan sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah Sarjana Muda Teknologi (Alam Sekitar), Fakulti Sains dan Teknologi , Universiti Malaysia Terengganu.

Disahkan oleh


.....

Penyelia Utama

Nama: Dr. Wan Mohd Norsani b Wan Nik

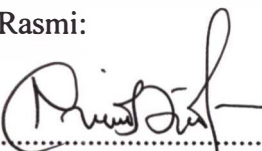
Cop Rasmi: **DR. WAN MOHD NORSANI WAN NIK**
Head
Department of Maritime Technology
Faculty of Maritime Studies and Marine Science
Universiti Malaysia Terengganu (UMT)
21030 Kuala Terengganu.

Tarikh: 30/5/07

Penyelia Kedua

Nama: Encik Mohd Zamri b Ibrahim

Cop Rasmi:


.....

Tarikh: 27-05-07.

Ketua Jabatan Sains Kejuruteraan

Nama: Dr. Nora'aini bt Ali

Cop Rasmi: **DR. NORA'AINI BINTI ALI**
Ketua
Jabatan Sains Kejuruteraan
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu

Tarikh:.....

ACKNOWLEDGEMENT

First of all, I would like to express my deepest appreciation and sincere gratitude to my supervisor. Dr Wan Mohd Norsani Wan Nik for his invaluable guidance, advice, encouragement, patience, support and time in helping me on this project. In addition, he has expansively reviewed the text, for which I am enormously grateful.

I am very grateful to my beloved parents for their love and support during my education years.

Not forgetting also to my friends and my course mates; for their support especially to Mohd Faizal Abdullah, Ainul Nazrah, Nazarul Afida, Norashmah and last but not least Mod Shuib Ishak for lending me his computer during my thesis writing.

ABSTRACT

This research is done to determine the viscometric properties of natural oils (RBD palm oil) and its blend with hydraulic oil (Shell Tellus 46). In this research parameters that will be checked are effects of temperature and shear rate towards viscosity properties of the system. In addition, equation and graphical relationship are established to predict apparent viscosity of the oils as a function of temperature and shear rate. The pure RBD palm oil and their blends with Shell Tellus 46 (25%, 50% and 75% of RBD palm blended with hydraulic oil) were prepared by weight. Densities were measured three times at 30°C and the averages were calculated. Viscosities were measured for each liquid sample in duplicate by using Brookfield DV-I+ viscometer (Stoughton, MA, USA). The oils temperature and shear rate were measured over range of 40°C-100°C and 3.9-131.6s⁻¹. It was found that viscosity is influenced by temperature and shear rate.

ABSTRAK

Eksperimen ini bertujuan untuk mengkaji ciri-ciri viscometrik minyak semulajadi (minyak sawit RBD) dan campurannya dalam minyak hidraulik (Shell Tellus 46). Ini dilakukan dengan mengkaji perubahan kelikatan dinamik dengan perubahan suhu dan keterikkan ricih. Projek ini bertujuan menentukan persamaan dan hubungan grafik untuk membuat ramalan kelikatan dinamik bagi minyak tersebut terhadap fungsi suhu dan kadar keterikkan ricih. RBD tulen dan campurannya dengan Shell Tellus 46 (25%, 50% dan 75% RBD dicampurkan dengan minyak hidraulik) disediakan mengikut berat. Ketumpatan diukur sebanyak 3 kali pada 30°C dan nilai purata diambil. Kelikatan diukur menggunakan Brookfield DV-I+ Viscometer (Stoughton, MA, USA.). Suhu dan kadar keterikkan ricih semua minyak masing-masing diukur pada julat suhu 40°C-100°C dan keterikkan ricih 3.9-131.6s⁻¹. Didapati, kelikatan dipengaruhi oleh suhu dan keterikkan ricih.