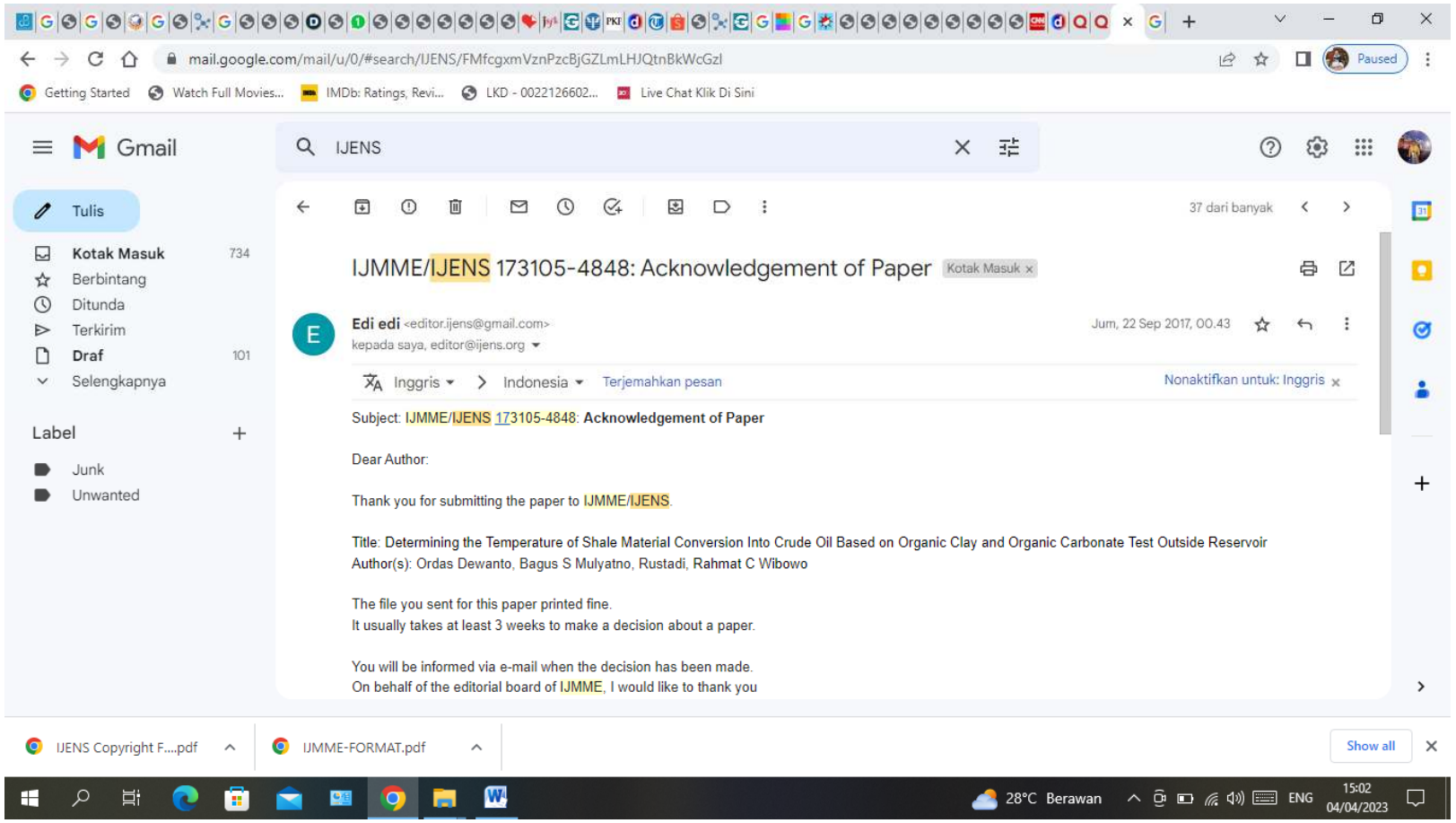
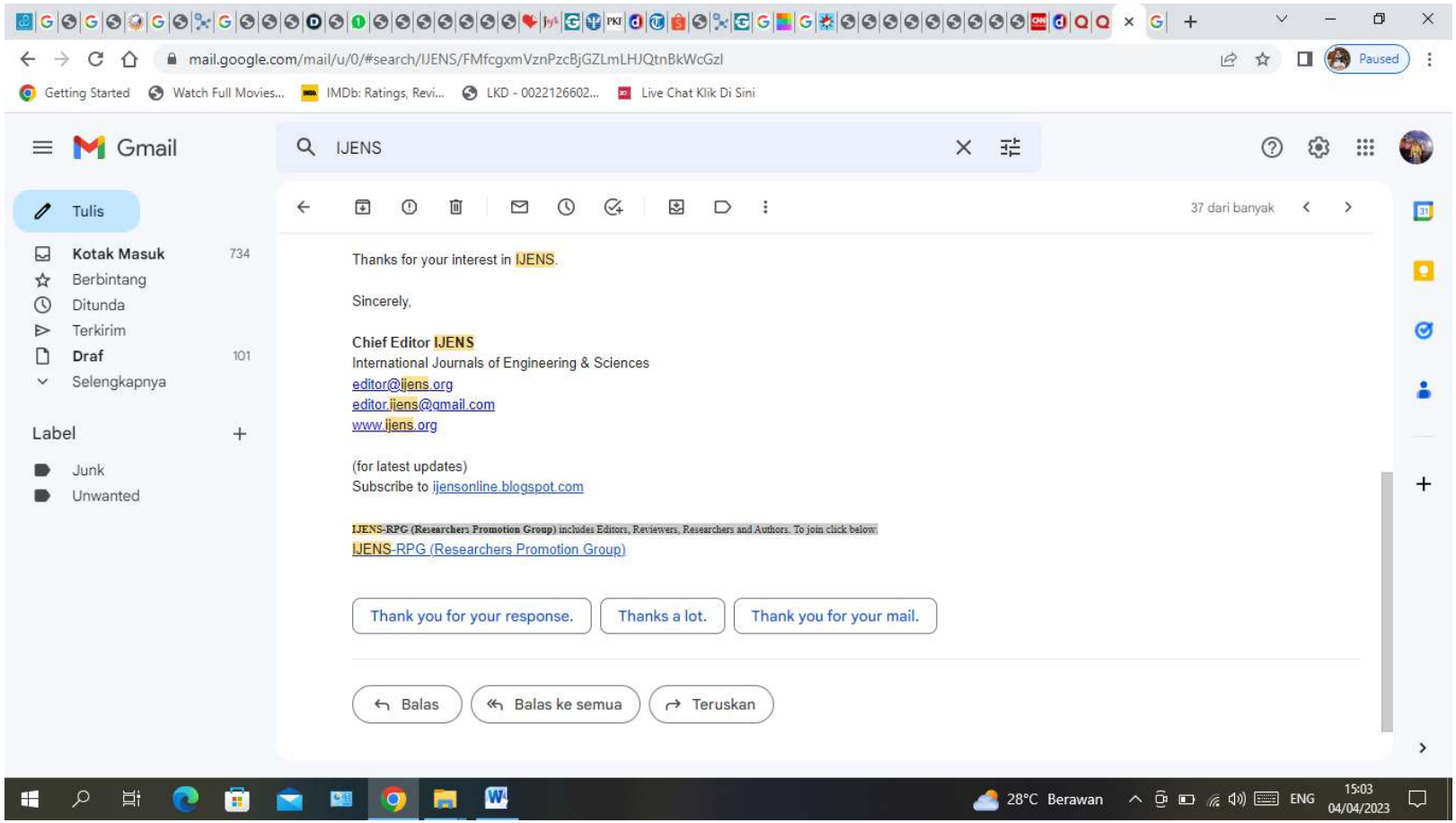
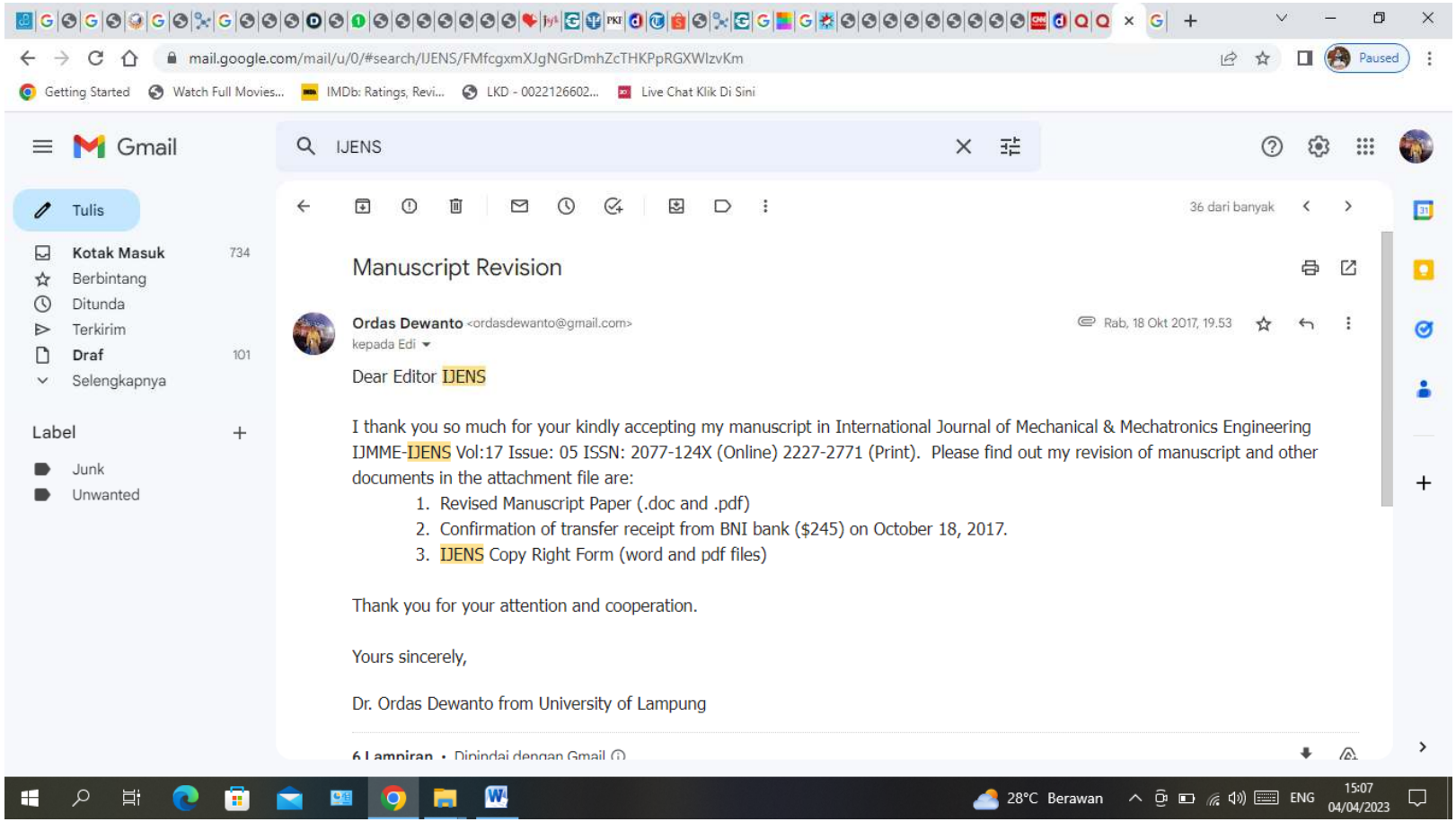
KORESPONDENSI JURNAL
International Journal of Mechanical & Mechatronics Engineering
IJMME-IJENS

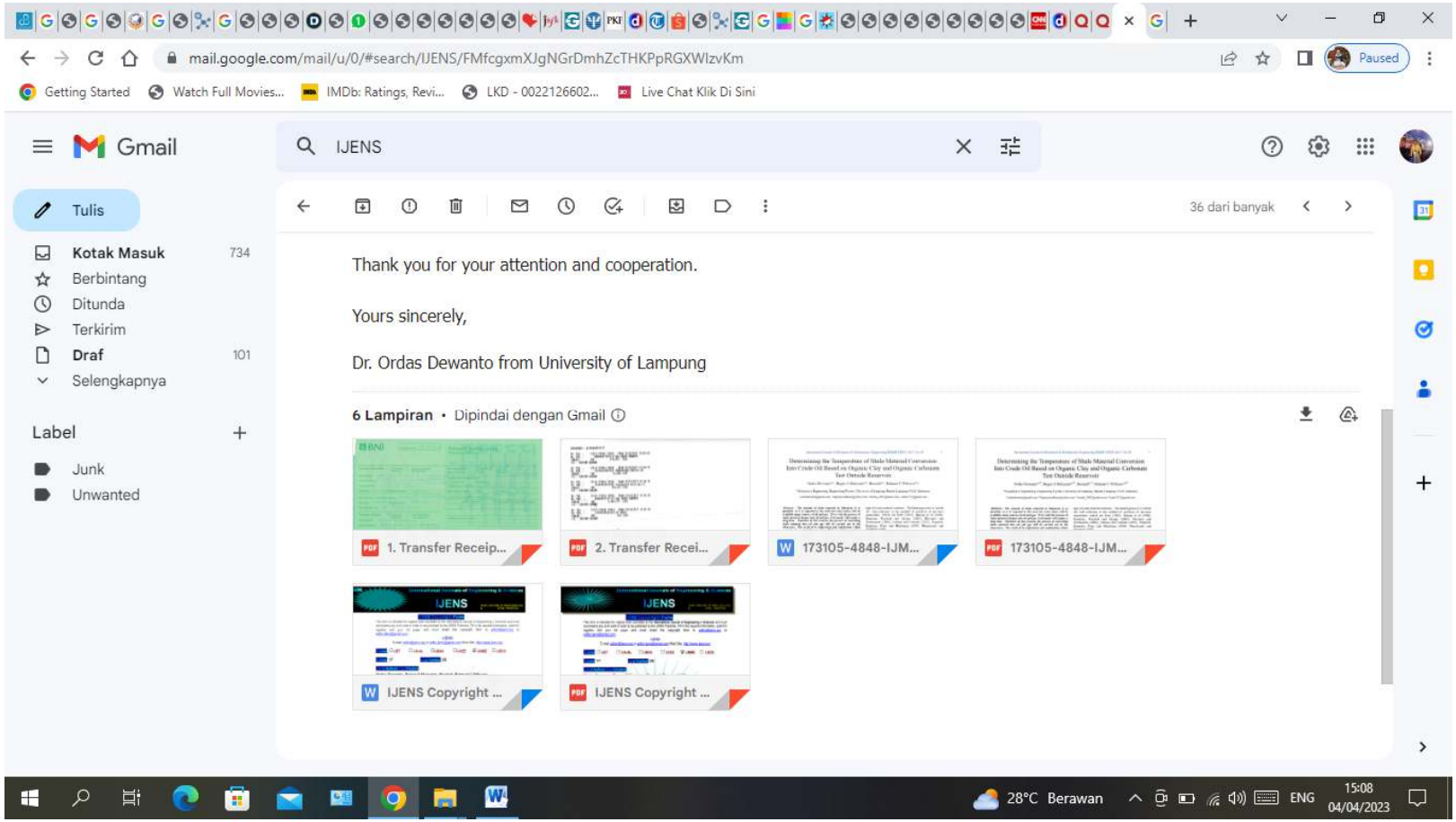
IJMME/IJENS 173105-4848: Acknowledgement of Paper, 22-9-2017



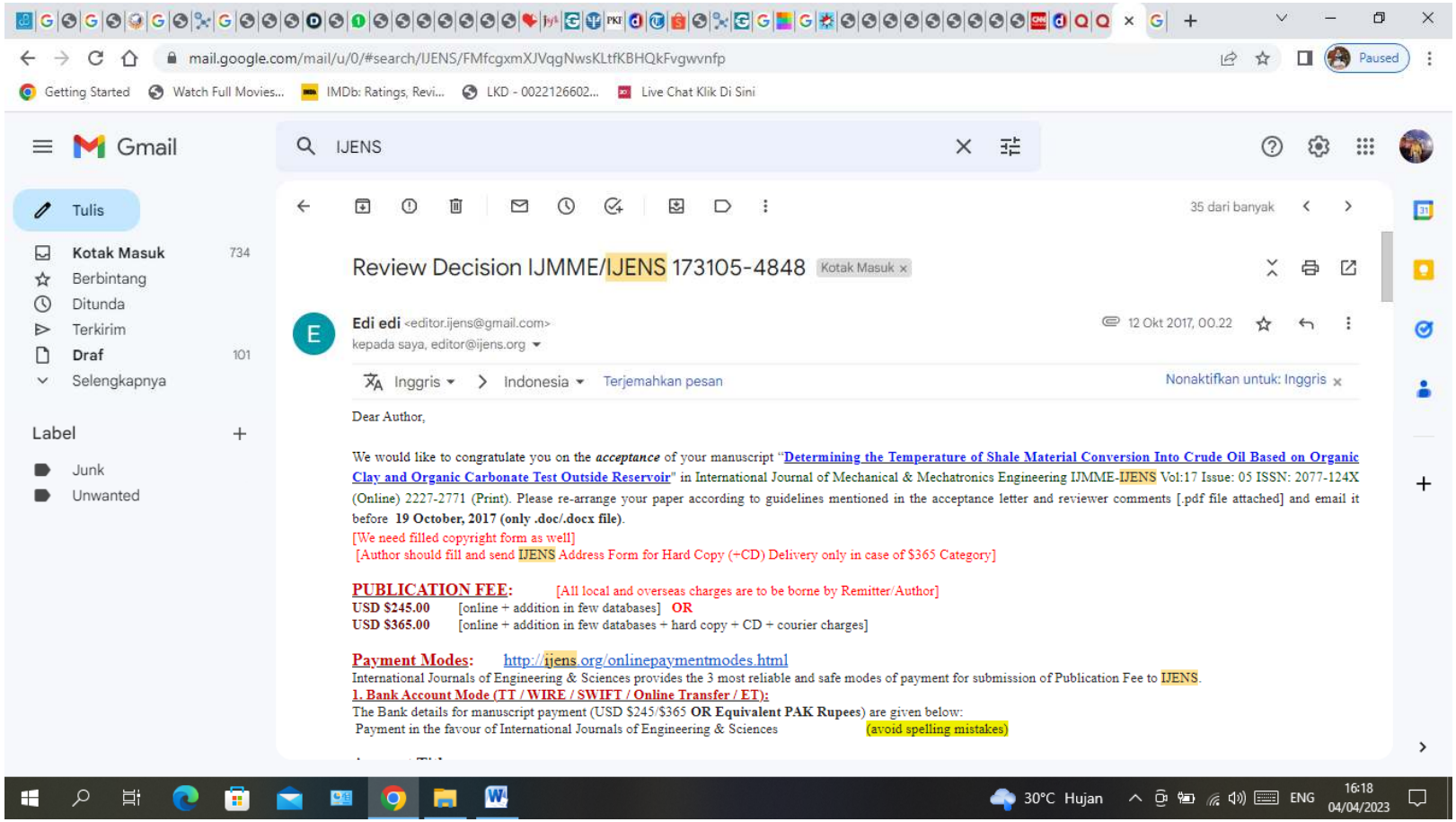

mail.google.com/mail/u/0/#search/IJENS/FMfcgxmVznPzcBjGZLmLHJQtnBkWcGzl
Paused
Getting Started
Watch Full Movies...
IMDb: Ratings, Revi...
LKD - 0022126602...
Live Chat Klik Di Sini
Gmail
IJENS
Tulis
Kotak Masuk 734
Berbintang
Ditunda
Terkirim
Draf 101
Selengkapnya
Label
Junk
Unwanted
37 dari banyak
Thanks for your interest in IJENS.
Sincerely,
Chief Editor IJENS
International Journals of Engineering & Sciences
editor@ijens.org
editor.ijens@gmail.com
www.ijens.org
(for latest updates)
Subscribe to ijensonline.blogspot.com
IJENS-RPG (Researchers Promotion Group) includes Editors, Reviewers, Researchers and Authors. To join click below:
IJENS-RPG (Researchers Promotion Group)
Thank you for your response.
Thanks a lot.
Thank you for your mail.
Balas
Balas ke semua
Teruskan
28°C Berawan
ENG
15:03
04/04/2023

Manuscript Revision, 18-10-2017




mail.google.com/mail/u/0/#search/IJENS/FMfcgxmXJgNGrDmhZcTHKPpRGXWlzvKm
Paused
Getting Started
Watch Full Movies...
IMDb: Ratings, Revi...
LKD - 0022126602...
Live Chat Klik Di Sini
Gmail
IJENS
Tulis
Kotak Masuk 734
Berbintang
Ditunda
Terkirim
Draf 101
Selengkapnya
Label
Junk
Unwanted
36 dari banyak
Thank you for your attention and cooperation.
Yours sincerely,
Dr. Ordas Dewanto from University of Lampung
6 Lampiran • Dipindai dengan Gmail
1. Transfer Receip...
2. Transfer Recei...
173105-4848-IJM...
173105-4848-IJM...
IJENS Copyright ...
IJENS Copyright ...
28°C Berawan
ENG
15:08
04/04/2023

Review Decision IJMME/IJENS 173105-4848, 12-10-2017



mail.google.com/mail/u/0/#search/IJENS/FMfcgxmXJVqgNwsKLtfKBHQkFvgwvnfp

Getting Started | Watch Full Movies... | IMDb: Ratings, Revi... | LKD - 0022126602... | Live Chat Klik Di Sini

Gmail

IJENS

Tulis

Kotak Masuk 734
Berbintang
Ditunda
Terkirim
Draf 101
Selengkapnya

Label
Junk
Unwanted

35 dari banyak

Review Decision IJMME/IJENS 173105-4848 Kotak Masuk ×

Edi edi <editor.ijens@gmail.com> 12 Okt 2017, 00.22
kepada saya, editor@ijens.org

Inggris → Indonesia Terjemahkan pesan Nonaktifkan untuk: Inggris ×

Dear Author,

We would like to congratulate you on the ***acceptance*** of your manuscript "**Determining the Temperature of Shale Material Conversion Into Crude Oil Based on Organic Clay and Organic Carbonate Test Outside Reservoir**" in International Journal of Mechanical & Mechatronics Engineering IJMME-IJENS Vol:17 Issue: 05 ISSN: 2077-124X (Online) 2227-2771 (Print). Please re-arrange your paper according to guidelines mentioned in the acceptance letter and reviewer comments [.pdf file attached] and email it before **19 October, 2017 (only .doc/.docx file)**.

[We need filled copyright form as well]

[Author should fill and send IJENS Address Form for Hard Copy (+CD) Delivery only in case of $365 Category]

PUBLICATION FEE: [All local and overseas charges are to be borne by Remitter/Author]

USD $245.00 [online + addition in few databases] **OR**

USD $365.00 [online + addition in few databases + hard copy + CD + courier charges]

Payment Modes: http://ijens.org/onlinepaymentmodes.html

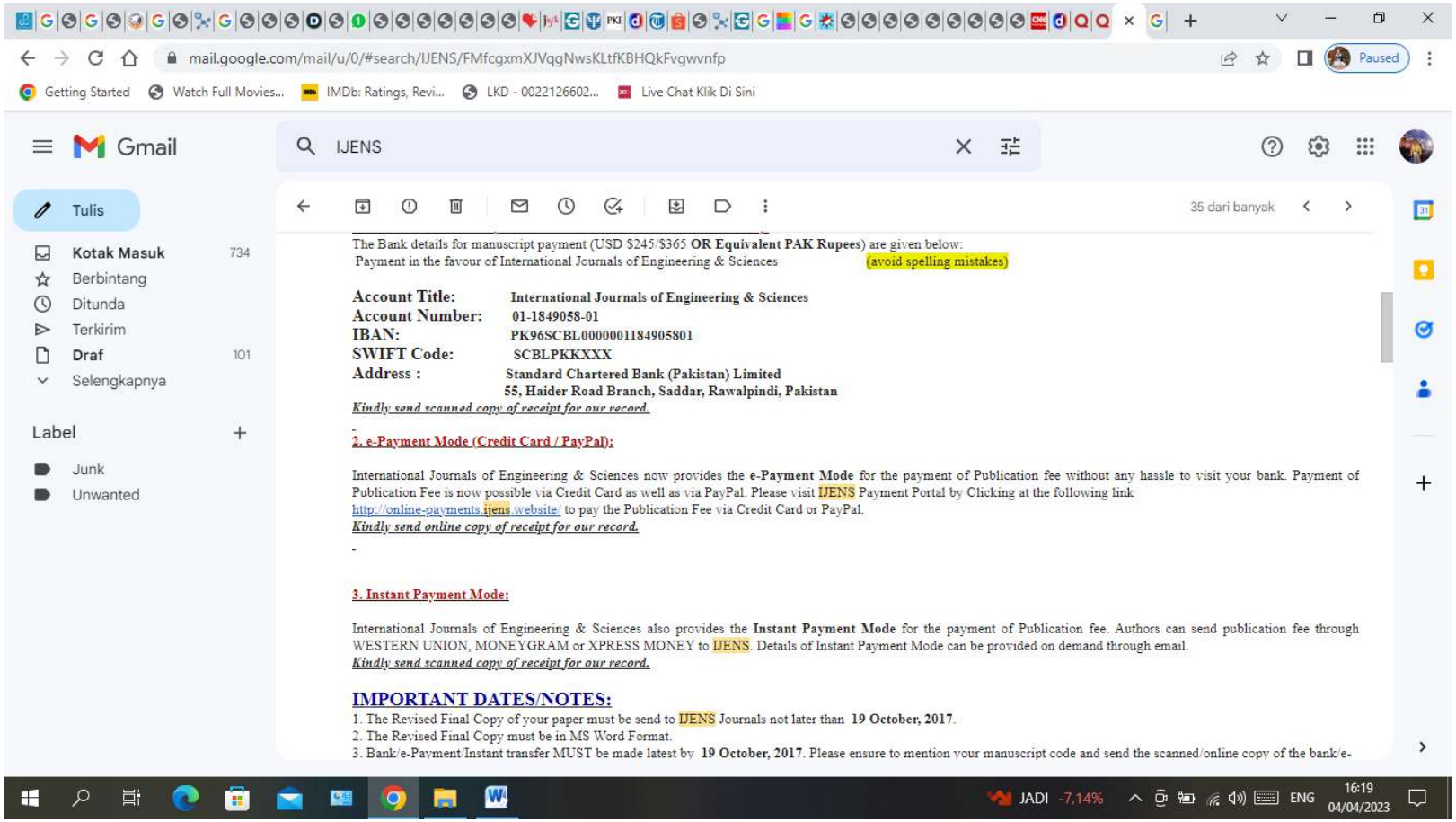
International Journals of Engineering & Sciences provides the 3 most reliable and safe modes of payment for submission of Publication Fee to IJENS.

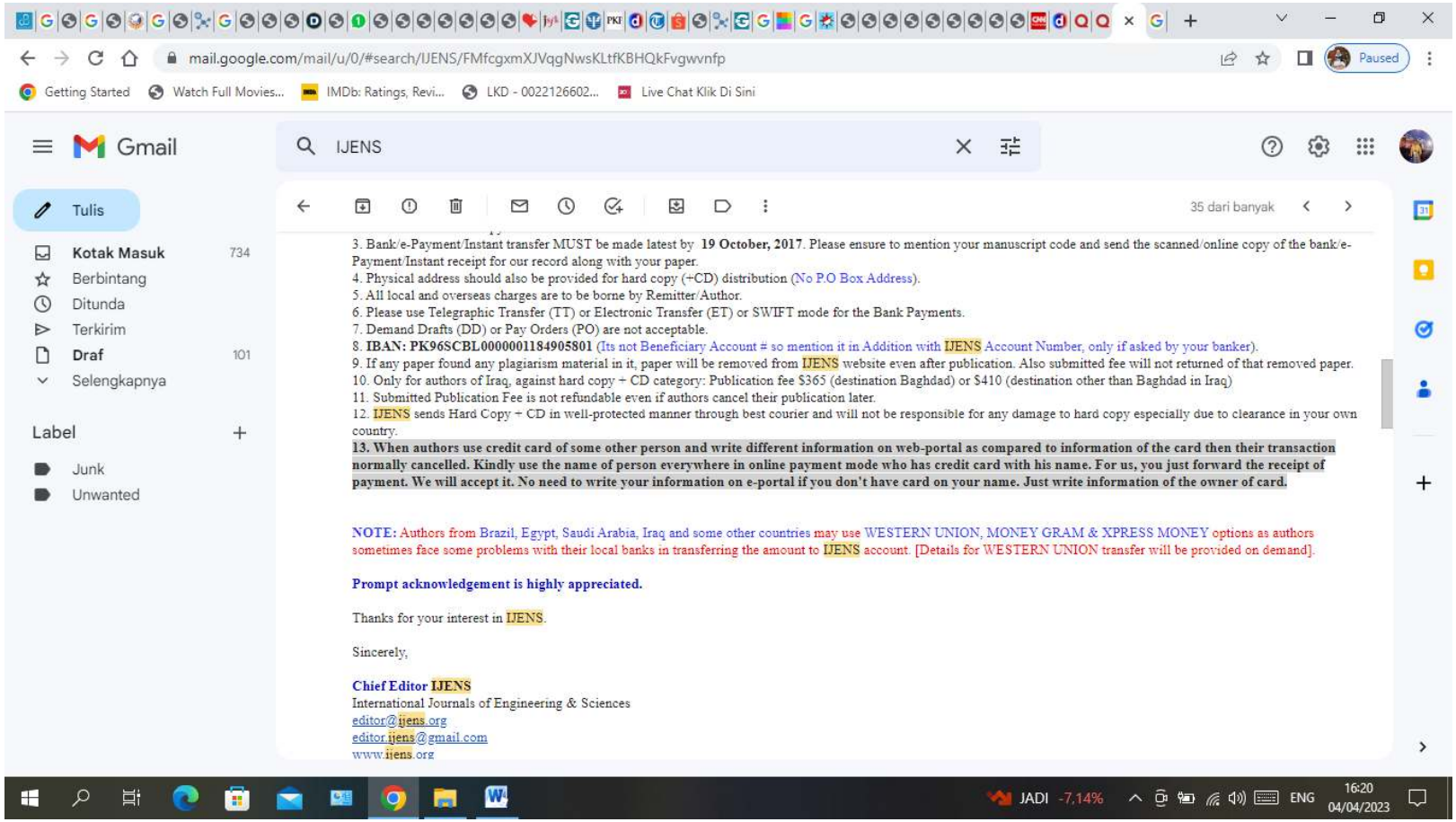
1. Bank Account Mode (TT / WIRE / SWIFT / Online Transfer / ET):

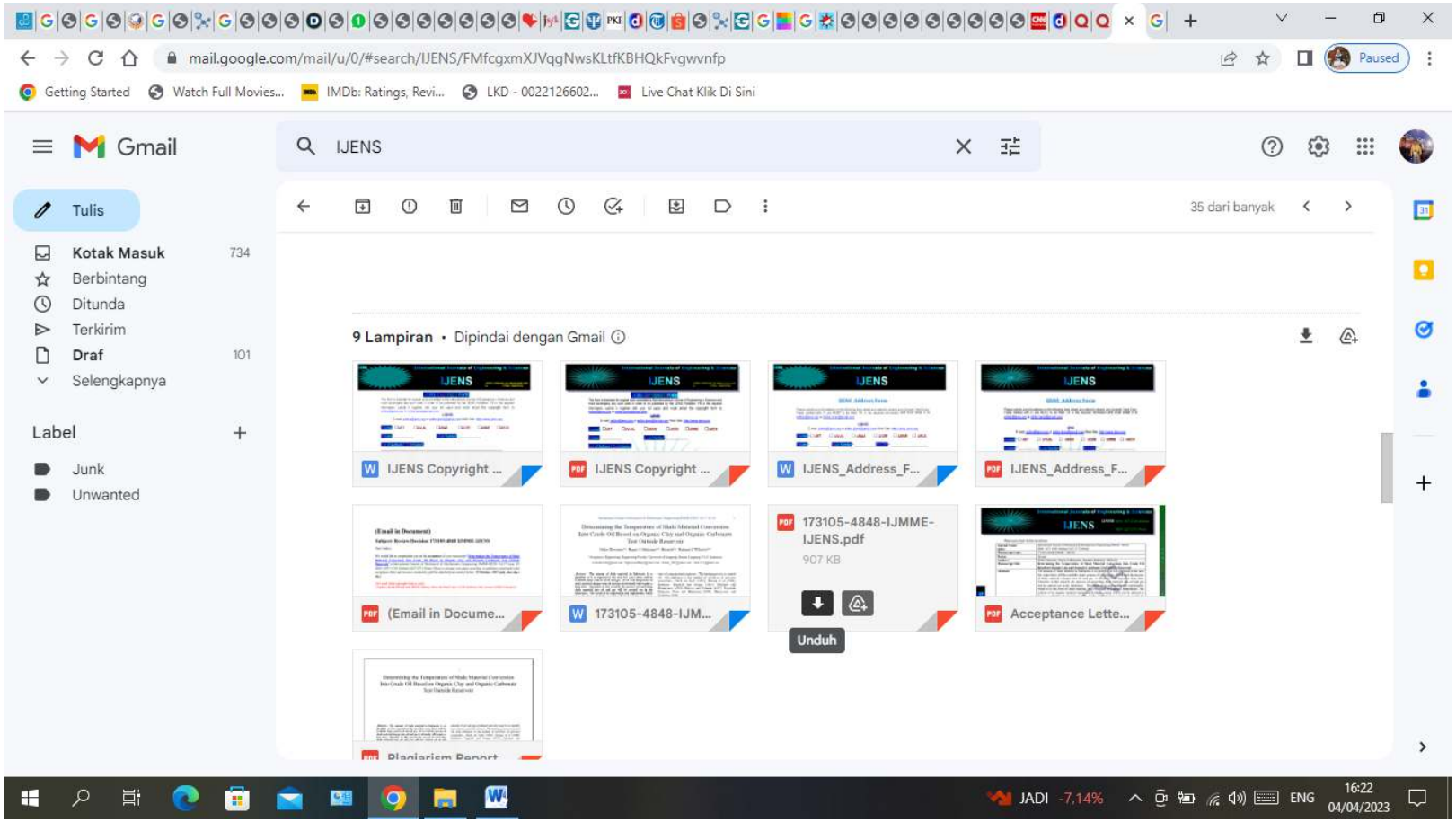
The Bank details for manuscript payment (USD $245/$365 **OR Equivalent PAK Rupees**) are given below:

Payment in the favour of International Journals of Engineering & Sciences (avoid spelling mistakes)

30°C Hujan ENG 16:18 04/04/2023


mail.google.com/mail/u/0/#search/IJENS/FMfcgxmXJVqgNwsKLtfKBHQkFvgwvnfp
Paused
Getting Started
Watch Full Movies...
IMDb: Ratings, Revi...
LKD - 0022126602...
Live Chat Klik Di Sini
Gmail
IJENS
Tulis
Kotak Masuk 734
Berbintang
Ditunda
Terkirim
Draf 101
Selengkapnya
Label
Junk
Unwanted
35 dari banyak
The Bank details for manuscript payment (USD $245/$365 OR Equivalent PAK Rupees) are given below:
Payment in the favour of International Journals of Engineering & Sciences (avoid spelling mistakes)
Account Title: International Journals of Engineering & Sciences
Account Number: 01-1849058-01
IBAN: PK96SCBL0000001184905801
SWIFT Code: SCBLPKKXXX
Address : Standard Chartered Bank (Pakistan) Limited
55, Haider Road Branch, Saddar, Rawalpindi, Pakistan
Kindly send scanned copy of receipt for our record.
2. e-Payment Mode (Credit Card / PayPal):
International Journals of Engineering & Sciences now provides the e-Payment Mode for the payment of Publication fee without any hassle to visit your bank. Payment of Publication Fee is now possible via Credit Card as well as via PayPal. Please visit IJENS Payment Portal by Clicking at the following link
http://online-payments.ijens.website/ to pay the Publication Fee via Credit Card or PayPal.
Kindly send online copy of receipt for our record.
3. Instant Payment Mode:
International Journals of Engineering & Sciences also provides the Instant Payment Mode for the payment of Publication fee. Authors can send publication fee through WESTERN UNION, MONEYGRAM or XPRESS MONEY to IJENS. Details of Instant Payment Mode can be provided on demand through email.
Kindly send scanned copy of receipt for our record.
IMPORTANT DATES/NOTES:
1. The Revised Final Copy of your paper must be send to IJENS Journals not later than 19 October, 2017.
2. The Revised Final Copy must be in MS Word Format.
3. Bank/e-Payment/Instant transfer MUST be made latest by 19 October, 2017. Please ensure to mention your manuscript code and send the scanned/online copy of the bank/e-
JADI -7,14%
ENG
16:19
04/04/2023


mail.google.com/mail/u/0/#search/IJENS/FMfcgxmXJVqgNwsKLtfKBHQkFvgwvnfp
Paused
Getting Started
Watch Full Movies...
IMDb: Ratings, Revi...
LKD - 0022126602...
Live Chat Klik Di Sini
Gmail
IJENS
Tulis
Kotak Masuk 734
Berbintang
Ditunda
Terkirim
Draf 101
Selengkapnya
Label
Junk
Unwanted
35 dari banyak
3. Bank/e-Payment/Instant transfer MUST be made latest by 19 October, 2017. Please ensure to mention your manuscript code and send the scanned/online copy of the bank/e-Payment/Instant receipt for our record along with your paper.
4. Physical address should also be provided for hard copy (+CD) distribution (No P.O Box Address).
5. All local and overseas charges are to be borne by Remitter/Author.
6. Please use Telegraphic Transfer (TT) or Electronic Transfer (ET) or SWIFT mode for the Bank Payments.
7. Demand Drafts (DD) or Pay Orders (PO) are not acceptable.
8. IBAN: PK96SCBL0000001184905801 (Its not Beneficiary Account # so mention it in Addition with IJENS Account Number, only if asked by your banker).
9. If any paper found any plagiarism material in it, paper will be removed from IJENS website even after publication. Also submitted fee will not returned of that removed paper.
10. Only for authors of Iraq, against hard copy + CD category: Publication fee $365 (destination Baghdad) or $410 (destination other than Baghdad in Iraq)
11. Submitted Publication Fee is not refundable even if authors cancel their publication later.
12. IJENS sends Hard Copy + CD in well-protected manner through best courier and will not be responsible for any damage to hard copy especially due to clearance in your own country.
13. When authors use credit card of some other person and write different information on web-portal as compared to information of the card then their transaction normally cancelled. Kindly use the name of person everywhere in online payment mode who has credit card with his name. For us, you just forward the receipt of payment. We will accept it. No need to write your information on e-portal if you don't have card on your name. Just write information of the owner of card.
NOTE: Authors from Brazil, Egypt, Saudi Arabia, Iraq and some other countries may use WESTERN UNION, MONEY GRAM & XPRESS MONEY options as authors sometimes face some problems with their local banks in transferring the amount to IJENS account. [Details for WESTERN UNION transfer will be provided on demand].
Prompt acknowledgement is highly appreciated.
Thanks for your interest in IJENS.
Sincerely,
Chief Editor IJENS
International Journals of Engineering & Sciences
editor@ijens.org
editor.ijens@gmail.com
www.iiens.org
JADI -7,14%
ENG
16:20
04/04/2023


mail.google.com/mail/u/0/#search/IJENS/FMfcgxmXJVqgNwsKLtfKBHQkFvgwvnfp
Paused
Getting Started
Watch Full Movies...
IMDb: Ratings, Revi...
LKD - 0022126602...
Live Chat Klik Di Sini
Gmail
IJENS
Tulis
Kotak Masuk 734
Berbintang
Ditunda
Terkirim
Draf 101
Selengkapnya
Label
Junk
Unwanted
35 dari banyak
9 Lampiran • Dipindai dengan Gmail
IJENS Copyright ...
IJENS Copyright ...
IJENS_Address_F...
IJENS_Address_F...
(Email in Docume...
173105-4848-IJM...
173105-4848-IJMME-IJENS.pdf
907 KB
Unduh
Acceptance Lette...
Plagiarism Report
JADI -7,14%
ENG
16:22
04/04/2023

Preparation of Papers for IEEE TRANSACTIONS and JOURNALS (Jan 2017)

First A. Author, Second B. Author, Jr., and Third C. Author, *Member, IEEE*

***Abstract*—These instructions give you guidelines for preparing papers for IEEE TRANSACTIONS and JOURNALS. Use this document as a template if you are using Microsoft *Word* 6.0 or later. Otherwise, use this document as an instruction set. The electronic file of your paper will be formatted further at IEEE. Define all symbols used in the abstract. Do not cite references in the abstract. Do not delete the blank line immediately above the abstract; it sets the footnote at the bottom of this column.**

***Index Terms*—About four key words or phrases in alphabetical order, separated by commas. For a list of suggested keywords, send a blank e-mail to keywords@ieee.org or visit** http://www.ieee.org/organizations/pubs/ani_prod/keywrd98.txt

I. INTRODUCTION

THIS document is a template for Microsoft *Word* versions 6.0 or later. If you are reading a paper or PDF version of this document, please download the electronic file, TRANS-JOUR.DOC, from the IEEE Web site at http://www.ieee.org/web/publications/authors/transjnl/index.html so you can use it to prepare your manuscript. If you would prefer to use LATEX, download IEEE's LATEX style and sample files from the same Web page. Use these LATEX files for formatting, but please follow the instructions in TRANS-JOUR.DOC or TRANS-JOUR.PDF.

If your paper is intended for a *conference*, please contact your conference editor concerning acceptable word processor formats for your particular conference.

When you open TRANS-JOUR.DOC, select "Page Layout" from the "View" menu in the menu bar (View | Page Layout), which allows you to see the footnotes. Then, type over sections of TRANS-JOUR.DOC or cut and paste from another document and use markup styles. The pull-down style menu is at the left of the Formatting Toolbar at the top of your *Word* window (for example, the style at this point in the document is "Text"). Highlight a section that you want to designate with a certain style, then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. **Do not change the font sizes or line spacing to squeeze more text into a limited number of pages.** Use italics for emphasis; do not underline.

To insert images in *Word*, position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with "float over text" unchecked).

IEEE will do the final formatting of your paper. If your paper is intended for a conference, please observe the conference page limits.

II. PROCEDURE FOR PAPER SUBMISSION

A. Review Stage

Please check with your editor on whether to submit your manuscript as hard copy or electronically for review. If hard copy, submit photocopies such that only one column appears per page. This will give your referees plenty of room to write comments. Send the number of copies specified by your editor (typically four). If submitted electronically, find out if your editor prefers submissions on disk or as e-mail attachments.

If you want to submit your file with one column electronically, please do the following:

--First, click on the View menu and choose Print Layout.

--Second, place your cursor in the first paragraph. Go to the Format menu, choose Columns, choose one column Layout, and choose "apply to whole document" from the dropdown menu.

--Third, click and drag the right margin bar to just over 4 inches in width.

The graphics will stay in the "second" column, but you can drag them to the first column. Make the graphic wider to push out any text that may try to fill in next to the graphic.

B. Final Stage

When you submit your final version (after your paper has

Manuscript received October 9, 2016. (Write the date on which you submitted your paper for review.) This work was supported in part by the U.S. Department of Commerce under Grant BS123456 (sponsor and financial support acknowledgment goes here). Paper titles should be written in uppercase and lowercase letters, not all uppercase. Avoid writing long formulas with subscripts in the title; short formulas that identify the elements are fine (e.g., "Nd–Fe–B"). Do not write "(Invited)" in the title. Full names of authors are preferred in the author field, but are not required. Put a space between authors' initials.

F. A. Author is with the National Institute of Standards and Technology, Boulder, CO 80305 USA (corresponding author to provide phone: 303-555-5555; fax: 303-555-5555; e-mail: author@ boulder.nist.gov).

S. B. Author, Jr., was with Rice University, Houston, TX 77005 USA. He is now with the Department of Physics, Colorado State University, Fort Collins, CO 80523 USA (e-mail: author@lamar.colostate.edu).

T. C. Author is with the Electrical Engineering Department, University of Colorado, Boulder, CO 80309 USA, on leave from the National Research Institute for Metals, Tsukuba, Japan (e-mail: author@nrim.go.jp).

been accepted), print it in two-column format, including figures and tables. You must also send your final manuscript on a disk, via e-mail, or through a Web manuscript submission system as directed by the society contact. You may use *Zip* or CD-ROM disks for large files, or compress files using *Compress*, *Pkzip*, *Stuffit*, or *Gzip*.

Also, send a sheet of paper or PDF with complete contact information for all authors. Include full mailing addresses, telephone numbers, fax numbers, and e-mail addresses. This information will be used to send each author a complimentary copy of the journal in which the paper appears. In addition, designate one author as the "corresponding author." This is the author to whom proofs of the paper will be sent. Proofs are sent to the corresponding author only.

C. Figures

Format and save your graphic images using a suitable graphics processing program that will allow you to create the images as PostScript (PS), Encapsulated PostScript (EPS), or Tagged Image File Format (TIFF), sizes them, and adjusts the resolution settings. If you created your source files in one of the following you will be able to submit the graphics without converting to a PS, EPS, or TIFF file: Microsoft Word, Microsoft PowerPoint, Microsoft Excel, or Portable Document Format (PDF).

D. Electronic Image Files (Optional)

Import your source files in one of the following: Microsoft Word, Microsoft PowerPoint, Microsoft Excel, or Portable Document Format (PDF); you will be able to submit the graphics without converting to a PS, EPS, or TIFF files. Image quality is very important to how yours graphics will reproduce. Even though we can accept graphics in many formats, we cannot improve your graphics if they are poor quality when we receive them. If your graphic looks low in quality on your printer or monitor, please keep in mind that cannot improve the quality after submission.

If you are importing your graphics into this Word template, please use the following steps:

Under the option EDIT select PASTE SPECIAL. A dialog box will open, select paste picture, then click OK. Your figure should now be in the Word Document.

If you are preparing images in TIFF, EPS, or PS format, note the following. High-contrast line figures and tables should be prepared with 600 dpi resolution and saved with no compression, 1 bit per pixel (monochrome), with file names in the form of "fig3.tif" or "table1.tif."

Photographs and grayscale figures should be prepared with 300 dpi resolution and saved with no compression, 8 bits per pixel (grayscale).

Sizing of Graphics

Most charts graphs and tables are one column wide (3 1/2 inches or 21 picas) or two-column width (7 1/16 inches, 43 picas wide). We recommend that you avoid sizing figures less than one column wide, as extreme enlargements may distort your images and result in poor reproduction. Therefore, it is better if the image is slightly larger, as a minor reduction in size should not have an adverse affect the quality of the image.

Size of Author Photographs

The final printed size of an author photograph is exactly 1 inch wide by 1 1/4 inches long (6 picas × 7 1/2 picas). Please ensure that the author photographs you submit are proportioned similarly. If the author's photograph does not appear at the end of the paper, then please size it so that it is proportional to the standard size of 1 9/16 inches wide by 2 inches long (9 1/2 picas × 12 picas). JPEG files are only accepted for author photos.

How to create a PostScript File

First, download a PostScript printer driver from http://www.adobe.com/support/downloads/pdrvwin.htm (for Windows) or from http://www.adobe.com/support/downloads/pdrvmac.htm (for Macintosh) and install the "Generic PostScript Printer" definition. In *Word*, paste your figure into a new document. Print to a file using the PostScript printer driver. File names should be of the form "fig5.ps." Use Open Type fonts when creating your figures, if possible. A listing of the acceptable fonts are as follows: Open Type Fonts: Times Roman, Helvetica, Helvetica Narrow, Courier, Symbol, Palatino, Avant Garde, Bookman, Zapf Chancery, Zapf Dingbats, and New Century Schoolbook.

Print Color Graphics Requirements

IEEE accepts color graphics in the following formats: EPS, PS, TIFF, Word, PowerPoint, Excel, and PDF. The resolution of a RGB color TIFF file should be 400 dpi.

When sending color graphics, please supply a high quality hard copy or PDF proof of each image. If we cannot achieve a satisfactory color match using the electronic version of your files, we will have your hard copy scanned. Any of the files types you provide will be converted to RGB color EPS files.

Web Color Graphics

IEEE accepts color graphics in the following formats: EPS, PS, TIFF, Word, PowerPoint, Excel, and PDF. The resolution of a RGB color TIFF file should be at least 400 dpi.

Your color graphic will be converted to grayscale if no separate grayscale file is provided. If a graphic is to appear in print as black and white, it should be saved and submitted as a black and white file. If a graphic is to appear in print or on IEEE Xplore in color, it should be submitted as RGB color.

Graphics Checker Tool

The IEEE Graphics Checker Tool enables users to check graphic files. The tool will check journal article graphic files against a set of rules for compliance with IEEE requirements. These requirements are designed to ensure sufficient image quality so they will look acceptable in print. After receiving a

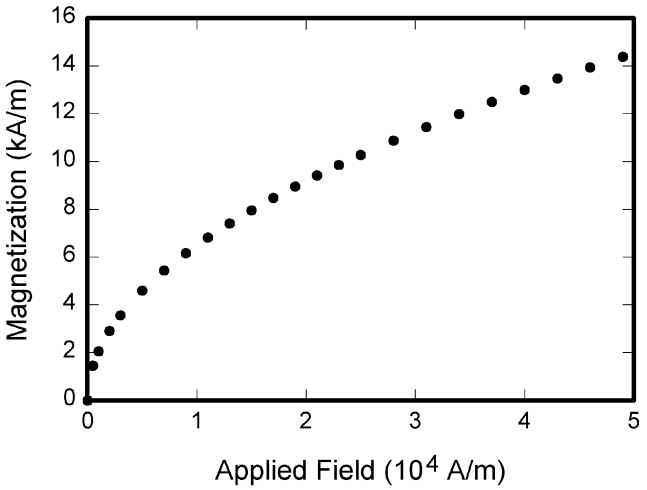


Fig. 1. Magnetization as a function of applied field. Note that "Fig." is abbreviated. There is a period after the figure number, followed by two spaces. It is good practice to explain the significance of the figure in the caption.

graphic or a set of graphics, the tool will check the files against a set of rules. A report will then be e-mailed listing each graphic and whether it met or failed to meet the requirements. If the file fails, a description of why and instructions on how to correct the problem will be sent. The IEEE Graphics Checker Tool is available at http://graphicsqc.ieee.org/

For more Information, contact the IEEE Graphics H-E-L-P Desk by e-mail at graphics@ieee.org. You will then receive an e-mail response and sometimes a request for a sample graphic for us to check.

E. Copyright Form

An IEEE copyright form should accompany your final submission. You can get a .pdf, .html, or .doc version at http://www.ieee.org/copyright. Authors are responsible for obtaining any security clearances.

III. Math

If you are using *Word*, use either the Microsoft Equation Editor or the *MathType* add-on (http://www.mathtype.com) for equations in your paper (Insert | Object | Create New | Microsoft Equation *or* MathType Equation). "Float over text" should *not* be selected.

IV. Units

Use either SI (MKS) or CGS as primary units. (SI units are strongly encouraged.) English units may be used as secondary units (in parentheses). **This applies to papers in data storage.** For example, write "15 Gb/cm^2 (100 Gb/in^2)." An exception is when English units are used as identifiers in trade, such as "3½-in disk drive." Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity in an equation.

TABLE I
Units for Magnetic Properties

Symbol	Quantity	Conversion from Gaussian and CGS EMU to SI [a]
Φ	magnetic flux	1 Mx $\rightarrow 10^{-8}$ Wb = 10^{-8} V·s
B	magnetic flux density, magnetic induction	1 G $\rightarrow 10^{-4}$ T = 10^{-4} Wb/m^2
H	magnetic field strength	1 Oe $\rightarrow 10^3/(4\pi)$ A/m
m	magnetic moment	1 erg/G = 1 emu $\rightarrow 10^{-3}$ A·m^2 = 10^{-3} J/T
M	magnetization	1 erg/(G·cm^3) = 1 emu/cm^3 $\rightarrow 10^3$ A/m
$4\pi M$	magnetization	1 G $\rightarrow 10^3/(4\pi)$ A/m
σ	specific magnetization	1 erg/(G·g) = 1 emu/g $\rightarrow$ 1 A·m^2/kg
j	magnetic dipole moment	1 erg/G = 1 emu $\rightarrow 4\pi \times 10^{-10}$ Wb·m
J	magnetic polarization	1 erg/(G·cm^3) = 1 emu/cm^3 $\rightarrow 4\pi \times 10^{-4}$ T
χ, κ	susceptibility	1 $\rightarrow 4\pi$
χ_ρ	mass susceptibility	1 cm^3/g $\rightarrow 4\pi \times 10^{-3}$ m^3/kg
μ	permeability	1 $\rightarrow 4\pi \times 10^{-7}$ H/m = $4\pi \times 10^{-7}$ Wb/(A·m)
μ_r	relative permeability	$\mu \rightarrow \mu_r$
w, W	energy density	1 erg/cm^3 $\rightarrow 10^{-1}$ J/m^3
N, D	demagnetizing factor	1 $\rightarrow 1/(4\pi)$

Vertical lines are optional in tables. Statements that serve as captions for the entire table do not need footnote letters.

[a] Gaussian units are the same as cgs emu for magnetostatics; Mx = maxwell, G = gauss, Oe = oersted; Wb = weber, V = volt, s = second, T = tesla, m = meter, A = ampere, J = joule, kg = kilogram, H = henry.

The SI unit for magnetic field strength H is A/m. However, if you wish to use units of T, either refer to magnetic flux density B or magnetic field strength symbolized as $\mu_0 H$. Use the center dot to separate compound units, e.g., "A·m^2."

V. Helpful Hints

A. Figures and Tables

Because IEEE will do the final formatting of your paper, you do not need to position figures and tables at the top and bottom of each column. In fact, all figures, figure captions, and tables can be at the end of the paper. Large figures and tables may span both columns. Place figure captions below the figures; place table titles above the tables. If your figure has two parts, include the labels "(a)" and "(b)" as part of the artwork. Please verify that the figures and tables you mention in the text actually exist. **Please do not include captions as part of the figures. Do not put captions in "text boxes" linked to the figures. Do not put borders around the outside of your figures.** Use the abbreviation "Fig." even at the beginning of a sentence. Do not abbreviate "Table." Tables are numbered with Roman numerals.

Color printing of figures is available, but is billed to the authors. Include a note with your final paper indicating that you request and will pay for color printing. Do not use color unless it is necessary for the proper interpretation of your figures. If you want reprints of your color article, the reprint

order should be submitted promptly. There is an additional charge for color reprints. **Please note that many IEEE journals now allow an author to publish color figures on Xplore and black and white figures in print. Contact your society representative for specific requirements.**

Figure axis labels are often a source of confusion. Use words rather than symbols. As an example, write the quantity "Magnetization," or "Magnetization *M*," not just "*M*." Put units in parentheses. Do not label axes only with units. As in Fig. 1, for example, write "Magnetization (A/m)" or "Magnetization ($A \cdot m^{-1}$)," not just "A/m." Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)," not "Temperature/K."

Multipliers can be especially confusing. Write "Magnetization (kA/m)" or "Magnetization (10^3 A/m)." Do not write "Magnetization (A/m) × 1000" because the reader would not know whether the top axis label in Fig. 1 meant 16000 A/m or 0.016 A/m. Figure labels should be legible, approximately 8 to 12 point type.

B. References

Number citations consecutively in square brackets [1]. The sentence punctuation follows the brackets [2]. Multiple references [2], [3] are each numbered with separate brackets [1]–[3]. When citing a section in a book, please give the relevant page numbers [2]. In sentences, refer simply to the reference number, as in [3]. Do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] shows ... ." Please do not use automatic endnotes in *Word*, rather, type the reference list at the end of the paper using the "References" style.

Number footnotes separately in superscripts (Insert | Footnote).[1] Place the actual footnote at the bottom of the column in which it is cited; do not put footnotes in the reference list (endnotes). Use letters for table footnotes (see Table I).

Please note that the references at the end of this document are in the preferred referencing style. Give all authors' names; do not use "*et al*." unless there are six authors or more. Use a space after authors' initials. Papers that have not been published should be cited as "unpublished" [4]. Papers that have been accepted for publication, but not yet specified for an issue should be cited as "to be published" [5]. Papers that have been submitted for publication should be cited as "submitted for publication" [6]. Please give affiliations and addresses for private communications [7].

Capitalize only the first word in a paper title, except for proper nouns and element symbols. For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [8].

C. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as IEEE, SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write "C.N.R.S.," not "C. N. R. S." Do not use abbreviations in the title unless they are unavoidable (for example, "IEEE" in the title of this article).

D. Equations

Number equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). First use the equation editor to create the equation. Then select the "Equation" markup style. Press the tab key and write the equation number in parentheses. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators. Punctuate equations when they are part of a sentence, as in

$$\int_0^{r_2} F(r,\varphi)\, dr\, d\varphi = [\sigma r_2 / (2\mu_0)] \cdot \int_0^{\infty} \exp(-\lambda\,|\,z_j - z_i\,|)\, \lambda^{-1}\, J_1(\lambda r_2)\, J_0(\lambda r_i)\, d\lambda\,. \tag{1}$$

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature, but T is the unit tesla). Refer to "(1)," not "Eq. (1)" or "equation (1)," except at the beginning of a sentence: "Equation (1) is ... ."

E. Other Recommendations

Use one space after periods and colons. Hyphenate complex modifiers: "zero-field-cooled magnetization." Avoid dangling participles, such as, "Using (1), the potential was calculated." [It is not clear who or what used (1).] Write instead, "The potential was calculated by using (1)," or "Using (1), we calculated the potential."

Use a zero before decimal points: "0.25," not ".25." Use "cm^3," not "cc." Indicate sample dimensions as "0.1 cm × 0.2 cm," not "0.1 × 0.2 cm^2." The abbreviation for "seconds" is "s," not "sec." Do not mix complete spellings and abbreviations of units: use "Wb/m^2" or "webers per square meter," not "webers/m^2." When expressing a range of values, write "7 to 9" or "7-9," not "7~9."

A parenthetical statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.) In American English, periods and commas are within quotation marks, like "this period." Other punctuation is "outside"! Avoid contractions; for example, write "do not" instead of "don't." The serial comma is preferred: "A, B, and C" instead of "A, B and C."

If you wish, you may write in the first person singular or plural and use the active voice ("I observed that ..." or "We observed that ..." instead of "It was observed that ..."). Remember to check spelling. If your native language is not English, please get a native English-speaking colleague to

[1]It is recommended that footnotes be avoided (except for the unnumbered footnote with the receipt date on the first page). Instead, try to integrate the footnote information into the text.

carefully proofread your paper.

VI. Some Common Mistakes

The word "data" is plural, not singular. The subscript for the permeability of vacuum μ_0 is zero, not a lowercase letter "o." The term for residual magnetization is "remanence"; the adjective is "remanent"; do not write "remnance" or "remnant." Use the word "micrometer" instead of "micron." A graph within a graph is an "inset," not an "insert." The word "alternatively" is preferred to the word "alternately" (unless you really mean something that alternates). Use the word "whereas" instead of "while" (unless you are referring to simultaneous events). Do not use the word "essentially" to mean "approximately" or "effectively." Do not use the word "issue" as a euphemism for "problem." When compositions are not specified, separate chemical symbols by en-dashes; for example, "NiMn" indicates the intermetallic compound $Ni_{0.5}Mn_{0.5}$ whereas "Ni–Mn" indicates an alloy of some composition Ni_xMn_{1-x}.

Be aware of the different meanings of the homophones "affect" (usually a verb) and "effect" (usually a noun), "complement" and "compliment," "discreet" and "discrete," "principal" (e.g., "principal investigator") and "principle" (e.g., "principle of measurement"). Do not confuse "imply" and "infer."

Prefixes such as "non," "sub," "micro," "multi," and "ultra" are not independent words; they should be joined to the words they modify, usually without a hyphen. There is no period after the "et" in the Latin abbreviation "*et al.*" (it is also italicized). The abbreviation "i.e.," means "that is," and the abbreviation "e.g.," means "for example" (these abbreviations are not italicized).

An excellent style manual and source of information for science writers is [9]. A general IEEE style guide and an *Information for Authors* are both available at http://www.ieee.org/web/publications/authors/transjnl/index.html

VII. Editorial Policy

Submission of a manuscript is not required for participation in a conference. Do not submit a reworked version of a paper you have submitted or published elsewhere. Do not publish "preliminary" data or results. The submitting author is responsible for obtaining agreement of all coauthors and any consent required from sponsors before submitting a paper. IEEE Transactions and Journals strongly discourage courtesy authorship. It is the obligation of the authors to cite relevant prior work.

The Transactions and Journals Department does not publish conference records or proceedings. The Transactions does publish papers related to conferences that have been recommended for publication on the basis of peer review. As a matter of convenience and service to the technical community, these topical papers are collected and published in one issue of the Transactions.

At least two reviews are required for every paper submitted. For conference-related papers, the decision to accept or reject a paper is made by the conference editors and publications committee; the recommendations of the referees are advisory only. Undecipherable English is a valid reason for rejection. Authors of rejected papers may revise and resubmit them to the Transactions as regular papers, whereupon they will be reviewed by two new referees.

VIII. Publication Principles

The contents of IEEE Transactions and Journals are peer-reviewed and archival. The Transactions publishes scholarly articles of archival value as well as tutorial expositions and critical reviews of classical subjects and topics of current interest.

Authors should consider the following points:

1) Technical papers submitted for publication must advance the state of knowledge and must cite relevant prior work.
2) The length of a submitted paper should be commensurate with the importance, or appropriate to the complexity, of the work. For example, an obvious extension of previously published work might not be appropriate for publication or might be adequately treated in just a few pages.
3) Authors must convince both peer reviewers and the editors of the scientific and technical merit of a paper; the standards of proof are higher when extraordinary or unexpected results are reported.
4) Because replication is required for scientific progress, papers submitted for publication must provide sufficient information to allow readers to perform similar experiments or calculations and use the reported results. Although not everything need be disclosed, a paper must contain new, useable, and fully described information. For example, a specimen's chemical composition need not be reported if the main purpose of a paper is to introduce a new measurement technique. Authors should expect to be challenged by reviewers if the results are not supported by adequate data and critical details.
5) Papers that describe ongoing work or announce the latest technical achievement, which are suitable for presentation at a professional conference, may not be appropriate for publication in a Transactions or Journal.

IX. Conclusion

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

Appendix

Appendixes, if needed, appear before the acknowledgment.

ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments. Avoid expressions such as "One of us (S.B.A.) would like to thank ... ." Instead, write "F. A. Author thanks ... ." **Sponsor and financial support acknowledgments are placed in the unnumbered footnote on the first page, not here.**

REFERENCES

[1] G. O. Young, "Synthetic structure of industrial plastics (Book style with paper title and editor)," in *Plastics*, 2nd ed. vol. 3, J. Peters, Ed. New York: McGraw-Hill, 1964, pp. 15–64.

[2] W.-K. Chen, *Linear Networks and Systems* (Book style). Belmont, CA: Wadsworth, 1993, pp. 123–135.

[3] H. Poor, *An Introduction to Signal Detection and Estimation*. New York: Springer-Verlag, 1985, ch. 4.

[4] B. Smith, "An approach to graphs of linear forms (Unpublished work style)," unpublished.

[5] E. H. Miller, "A note on reflector arrays (Periodical style—Accepted for publication)," *IEEE Trans. Antennas Propagat.*, to be published.

[6] J. Wang, "Fundamentals of erbium-doped fiber amplifiers arrays (Periodical style—Submitted for publication)," *IEEE J. Quantum Electron.*, submitted for publication.

[7] C. J. Kaufman, Rocky Mountain Research Lab., Boulder, CO, private communication, May 1995.

[8] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interfaces (Translation Journals style)," *IEEE Transl. J. Magn.Jpn.*, vol. 2, Aug. 1987, pp. 740–741 [*Dig. 9th Annu. Conf. Magnetics* Japan, 1982, p. 301].

[9] M. Young, *The Techincal Writers Handbook.* Mill Valley, CA: University Science, 1989.

[10] J. U. Duncombe, "Infrared navigation—Part I: An assessment of feasibility (Periodical style)," *IEEE Trans. Electron Devices*, vol. ED-11, pp. 34–39, Jan. 1959.

[11] S. Chen, B. Mulgrew, and P. M. Grant, "A clustering technique for digital communications channel equalization using radial basis function networks," *IEEE Trans. Neural Networks*, vol. 4, pp. 570–578, Jul. 1993.

[12] R. W. Lucky, "Automatic equalization for digital communication," *Bell Syst. Tech. J.*, vol. 44, no. 4, pp. 547–588, Apr. 1965.

[13] S. P. Bingulac, "On the compatibility of adaptive controllers (Published Conference Proceedings style)," in *Proc. 4th Annu. Allerton Conf. Circuits and Systems Theory*, New York, 1994, pp. 8–16.

[14] G. R. Faulhaber, "Design of service systems with priority reservation," in *Conf. Rec. 1995 IEEE Int. Conf. Communications*, pp. 3–8.

[15] W. D. Doyle, "Magnetization reversal in films with biaxial anisotropy," in *1987 Proc. INTERMAG Conf.*, pp. 2.2-1–2.2-6.

[16] G. W. Juette and L. E. Zeffanella, "Radio noise currents n short sections on bundle conductors (Presented Conference Paper style)," presented at the IEEE Summer power Meeting, Dallas, TX, Jun. 22–27, 1990, Paper 90 SM 690-0 PWRS.

[17] J. G. Kreifeldt, "An analysis of surface-detected EMG as an amplitude-modulated noise," presented at the 1989 Int. Conf. Medicine and Biological Engineering, Chicago, IL.

[18] J. Williams, "Narrow-band analyzer (Thesis or Dissertation style)," Ph.D. dissertation, Dept. Elect. Eng., Harvard Univ., Cambridge, MA, 1993.

[19] N. Kawasaki, "Parametric study of thermal and chemical nonequilibrium nozzle flow," M.S. thesis, Dept. Electron. Eng., Osaka Univ., Osaka, Japan, 1993.

[20] J. P. Wilkinson, "Nonlinear resonant circuit devices (Patent style)," U.S. Patent 3 624 12, July 16, 1990.

[21] *IEEE Criteria for Class IE Electric Systems* (Standards style), IEEE Standard 308, 1969.

[22] *Letter Symbols for Quantities*, ANSI Standard Y10.5-1968.

[23] R. E. Haskell and C. T. Case, "Transient signal propagation in lossless isotropic plasmas (Report style)," USAF Cambridge Res. Lab., Cambridge, MA Rep. ARCRL-66-234 (II), 1994, vol. 2.

[24] E. E. Reber, R. L. Michell, and C. J. Carter, "Oxygen absorption in the Earth's atmosphere," Aerospace Corp., Los Angeles, CA, Tech. Rep. TR-0200 (420-46)-3, Nov. 1988.

[25] (Handbook style) *Transmission Systems for Communications*, 3rd ed., Western Electric Co., Winston-Salem, NC, 1985, pp. 44–60.

[26] *Motorola Semiconductor Data Manual*, Motorola Semiconductor Products Inc., Phoenix, AZ, 1989.

[27] (Basic Book/Monograph Online Sources) J. K. Author. (year, month, day). *Title* (edition) [Type of medium]. Volume (issue). Available: http://www.(URL)

[28] J. Jones. (1991, May 10). Networks (2nd ed.) [Online]. Available: http://www.atm.com

[29] (Journal Online Sources style) K. Author. (year, month). Title. *Journal* [Type of medium]. Volume(issue), paging if given. Available: http://www.(URL)

[30] R. J. Vidmar. (1992, August). On the use of atmospheric plasmas as electromagnetic reflectors. *IEEE Trans. Plasma Sci.* [Online]. *21(3).* pp. 876–880. Available: http://www.halcyon.com/pub/journals/21ps03-vidmar

First A. Author (M'76–SM'81–F'87) and the other authors may include biographies at the end of regular papers. Biographies are often not included in conference-related papers. This author became a Member (M) of IEEE in 1976, a Senior Member (SM) in 1981, and a Fellow (F) in 1987. The first paragraph may contain a place and/or date of birth (list place, then date). Next, the author's educational background is listed. The degrees should be listed with type of degree in what field, which institution, city, state, and country, and year degree was earned. The author's major field of study should be lower-cased.

The second paragraph uses the pronoun of the person (he or she) and not the author's last name. It lists military and work experience, including summer and fellowship jobs. Job titles are capitalized. The current job must have a location; previous positions may be listed without one. Information concerning previous publications may be included. Try not to list more than three books or published articles. The format for listing publishers of a book within the biography is: title of book (city, state: publisher name, year) similar to a reference. Current and previous research interests end the paragraph.

The third paragraph begins with the author's title and last name (e.g., Dr. Smith, Prof. Jones, Mr. Kajor, Ms. Hunter). List any memberships in professional societies other than the IEEE. Finally, list any awards and work for IEEE committees and publications. If a photograph is provided, the biography will be indented around it. The photograph is placed at the top left of the biography. Personal hobbies will be deleted from the biography.

Determining the Temperature of Shale Material Conversion Into Crude Oil Based on Organic Clay and Organic Carbonate Test Outside Reservoir

Ordas Dewanto*[,a)], Bagus S Mulyanto*[,b)], Rustadi*[,c)], Rahmat C Wibowo*[,d)]

*Geophysics Engineering, Engineering Faculty, University of Lampung, Bandar Lampung 35145, Indonesia

[a)]ordasdewanto@gmail.com, [b)]bagusyosodiharjo@yahoo.com, [c)]rustadi_2007@yahoo.com, [d)]catur3712@gmail.com

***Abstract*-- The amount of shale material in Indonesia is so plentiful, so it is expected in the next few years there will be available many sources of oil and gas. If we wait the process of shale material changes into oil and gas, it obviously will require a long time. Therefore in this reseach, the process of converting shale material into oil and gas will be carried out in the laboratory. The result of its exploration and exploitation, which is in the form of shale material, will be heated to a certain temperature , the content of its organic material reacts and produces energy which can be utilized as fuel as a subtitute of oil and gas. The waste of the process is also very useful for human life. Four shale materials used has a TOC value of ≥ 12%, which are 12.02%, 12.42%, 12.57% and 12.58%. These values are already qualified as oil shale. The time to change the shale material (organic-clay and organic-carbonate) into oil and gas, is determined by the characteristics of the shale material, which are: immature hydrocarbon substance that has API gravity and boiling point which is close to the boiling point of petroleum. The heating process at temperature of 200^{O}C to 400^{O}C changes the subtance into shale material with low boiling point, this is due to its high API degree so it contains alot of light fractions such as gasoline, hence its boiling point is low. The heating process affects the characteristics of flash point of the shale material. The process of change requires a short time around ï15 hours, so it is very efficient processing method outside reservoir, although further research need to be done to make it more perfect.**

***Index Term*-- shale material, TOC, organic clay, organic carbonate, oil shale**

1. INTRODUCTION

Effort to build laboratory acoustics data to detect the change of organic material properties in the rocks from the result of physics and chemistry properties analysis on reservoir rocks in Indonesia has been conducted by Siswoyo **(**1995), Subono (1995) and Dewanto et al (2002-2004). According to them, the result of measurement and analysis the change of rock chemical properties in the laboratory arises some methods which support this research. The method generated in the research is to determine the maturity of hydrocarbon and its parameter which are used as indicator to predict the level of change in organic material in the rocks (shale material).

In this research, pyrolysis is used to determine organic content (TOC), maturity of organic material, detecting the amount of oil and gas produced and also used to re-identify type of some material mixtures. The heating process is carried out with reference to the method of pyrolysis of previous researchers, which are Katz (1983), Berraja et al (1988), Kamtono, Praptisih and Siregar (2005), Heryanto and Hermiyanto (2006), Hidayat and Fatimah (2007), Praptisih, Kamtono, Putra and Hendrizan (*2009)*, Hermiyanto and Ningrum (*2009).*

Although on the scale of commercial production it will be generated a large anough waste, but apparently according to the theory, the waste can be employed as growing media, road embankment construction materials, cement raw materials. AL-Hasan (2006) has succeeded in doing research on the behavior of concrete made by using oil shale ash and mixture of cement, and the result is incredible, the concrete has a strong and elastic behavior. Another potential of industrial products of oil shale are such as carbon fiber, carbon absorption, black carbon, brick, building decoration, soil fertility, fertilizer and raw material of glass industry. Barkia, Belkbir, and Jayaweera (2004) have conducted a research once again about thermal analysis which was used to determine the effect of heating on oil shale material in Morocco, at temperature of 500°C. A fairly rapid research development, which was originally only conducting combustion without looking at its effect. The result of the research is quite gladdening, encourages the researches to conduct a research development on the shale material, as what has done by Peters, Walters, and Moldowan (2006). Then Al-Hamaiedh, Maaitah, and Mahadin (2010) conducted a research on the result of shale material combined with producing a large amount of ash, then examined the replacement of cement mortar with oil shale ash with a ratio of 10%, 20%, and 30%, which each of them is compared to the strength of mortar cube with pure cement**.** In 2002, Yoshioka and Ishiwatari conducted a research on micropyrolysis infrared laser system for analyzing organic material in the rock, which was then developed and applied on Green River's shale sample. Peters, Walters, and Moldowan, conducted a research on oil shale on shale.

Due to the different condition and observation scale between condition in the laboratory and in the revoir, so conversion of the result of modeling in the laboratory to reservoir condition should be conducted (Nakayama, 1987), with the help of heat capacity at each depth observed to the

laboratory scale which is calibrated, so it can be considered valid in the process of changing shale material into oil and gas.

According to the result of research from Bartis et al (2005), exploitation of shale material that has been collected is sent to a processing place by burning the shale directly to be utilized as source of electrical energy. Bartis et al (2005) also conducted underground shale material mining by applying room and pillar method. Then Burnham et al (2006) extracted the result of shale material processing, which was done on the ground (ex-situ processing), although there were some new technologies to extract the result of shale material processing under ground at the location or at in-situ processing.

To know hydrocarbon potential, shale material type, as well as the level of thermal maturity, chemical-material analysis is performed, namely organic geochemical analysis which is done by conducting *total organic carbon* analysis and also *Rock-Eval pyrolysis* (Tjahjono, 2004 and Tobing, 2003).

The heating test is begun by furnace, then conducted combustion test. The main result of the first test of organic clay and organic carbonate is obtained within the physical changes (color and phase). The exact temperature value is indispensable to change shale material into a solid material, liquid or gas (carbon substance) with a low boiling point. The changing process is expected to require a short time (±20 hours).

2. RESEARCH METHOD

2.1 Material Selection

Started by coring activity at each material which has been known. Picture 1 shows the coring on the material type facies A. Some materials used in this research are clay material (illite), carbonate (dolomite) and organic (naftalen).

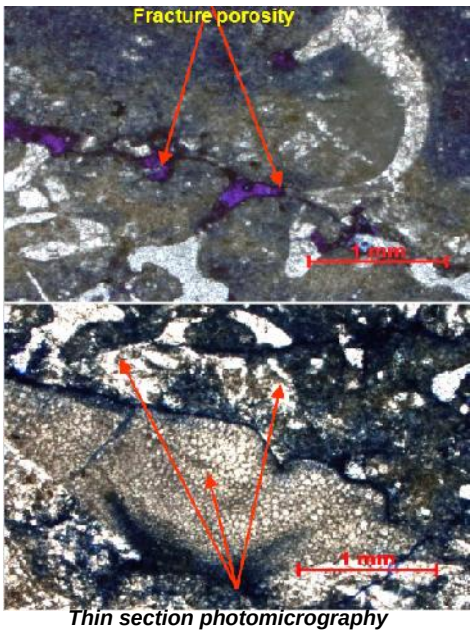


Fig. 1. Type of material taken from the Core Facies A

2.2 Shale Material Type Determination

Firstly, prepare the sample of clay and carbonate material which then are smashed using mechanical tool until it turns into rock powder. After that, do the unification process of the size of the rock powder particle radius by using the sieve which has been measured the size of its radius pores, then weigh.

Secondly, the organic material used is taken into a more specific, which is the organic material group of cyclic compound in the form of naphthalene.

Thirdly, material preparation with desired composition is gotten from composition of organic clay and organic carbonate material. Shale material is shyntesized with a certain ratio combined with the same grain size (Widjaya, 2012), followed by formation process with pres pressure differently to get material that is ready to be analyzed.

2.3 Material Characterization and Test

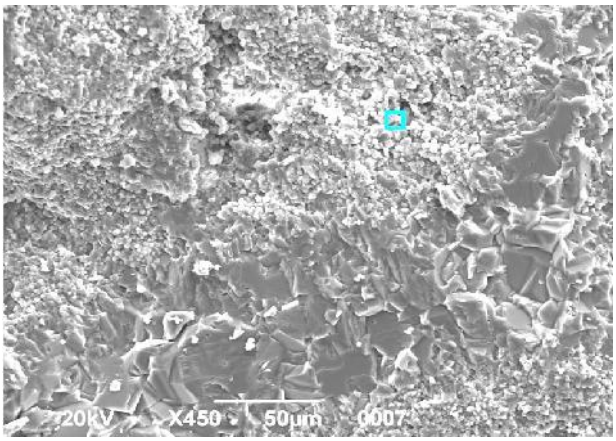
The most important characteristic is shale material that is made, has TOC value ≥ 12, which shows the characteristics of good oil shale used as a reference for comparison. Then to know the distribution of oxide on the surface of the shale, will be analyzed by using X-ray diffraction (XRD). Whereas to know the morphology of the material, it will be analyzed by using SEM analysis. Further, shale material testing is conducted, which is by heating and combustion, so that the temperature of oil shale formation and the change of material into oil and gas can be determined.

3. DISCUSSION

3.1 Result of Material Characterization

Characterization result of SEM and EDAX shows that the clay material type is illite $(Si_7Al)O_{20}(OH)$, it can be seen at Figure 2. Clay material always accompanies the reservoir material containing organic material.

At the time of pyrolysis testing, this material will be added with material organic, so it can be known exactly whether this clay material acts as disturber or otherwise assists the maturation process of organic material in reservoir material.



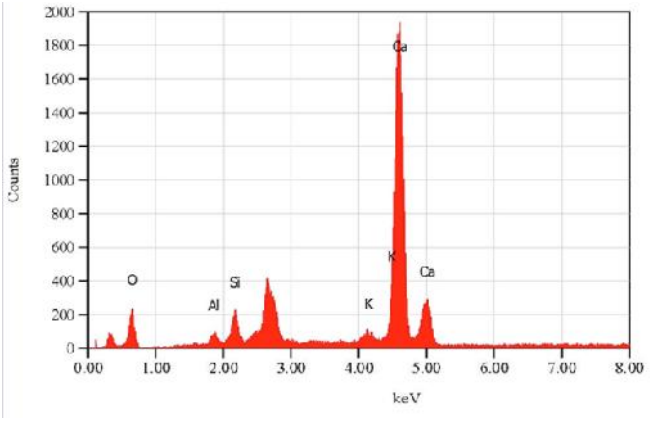
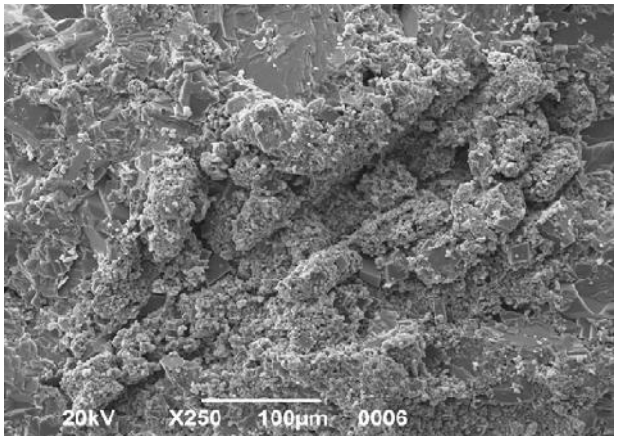


Fig. 2. Clay material type illite

Figure 3 is the result of material characterization which shows carbonate material with the type dolomite [$CaMg(CO_3)_2$]. This is supported by the result of characterization using SEM and Edax analysis.



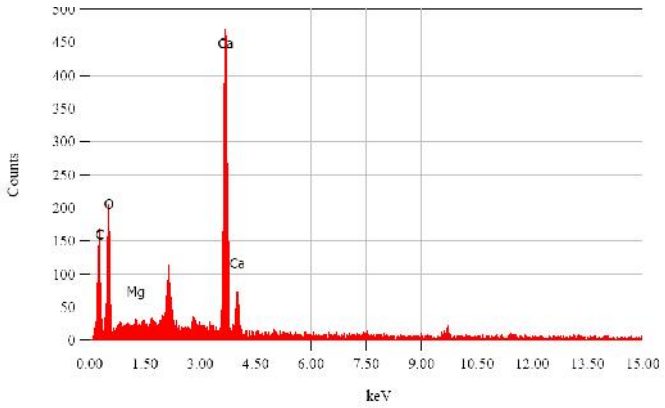


Fig. 3. Material type Dolomite $CaMg(CO_3)_2$

3.2 TOC Analysis

To know hydrocarbon potential, shale material type, as well as the level of thermal maturity, chemical-material analysis is conducted, that is by organic geochemical analysis in the form of *total organic carbon* (TOC). Material characterized in this research is natural clay that has been put together with organic material, which is organic material in the form of naphthalene. Then the natural clay is replaced with natural carbonate which is also incorporated with the organic compound, a compound contained in the shale material (oil shale), so that two shale materials are formed (Organic Clay and Organic Carbonate) which have TOC value ≥ 12%. The comparison of organic material with clay or carbonate will affect the organic carbon content and the maximum temperature. In this research, the material properties of clay and carbonate mass are varied and tested. Before the material is selected, characterization is conducted first by using SEM and XRD analysis. Material in the nature contains a variety of substances, chemical compounds and different characteristics, therefore it is necessary to know the material identity. Table I shows the data of TOC testing result on 4 samples of Organic-Clay and Organic-Carbonate.

Table I
TOC Data and Pyrolysis

Sample Name	TOC (%)
Sample-1 (Organic Clay)	12,02
Sample-2 (Organic Clay)	12,42
Sample-3 (Organic Carbonate)	12,57
Sample-4 (Organic Carbonate)	12,86

Furthermore, both of shale materials (Organic-Clay and Organic-Carbonate), which have been characterized by using a variety of methods, will produce physical and chemical properties information. Beside that it can be obtained some laboratory test parameters and conceived in detail the mechanism of oil shale reaction model into crude oil.

3.3 Organic Clay Material Test

Figure 4 is organic clay material, that is illite and naphthalene mixture, which is ready to be heated.

Fig. 4. Organic clay material (illite+naftalen)

The heating at temperature of $300^{O}C$ produces a color change becomes brighter, cleaner and the form is smoother. Then it also produces fluid in two conditions, the muddy color and the clean one. The fluid is a form of oil shale material (immature hydrocarbon). It is shown at Figure 5.

Fig. 5. The heating of organic clay at T=300^{O}C

Figure 6 shows the heating at T=400^{O}C, which results in a change of color becomes brighter, cleaner and the form is smoother than the heating at temperature of 300^{O}C. Then it also produces fluid in two conditions, the muddy color and the clean one. The fluid is a form of shale oil material (immature hydrocarbon or crude oil).

Fig. 6. The heating of organic clay at T=400^{O}C

Figure 7 shows the heating at T=1000^{O}C, which results in a change of color becomes brighter and the form is smoother than the heating at 400^{O}C. Then it is also produced fluid in humid condition which adheres at the wall of glass tube, in a few hours, the liquid will disappear and leave crust (gas).

Fig. 7. The heating of organic clay at T=1000^{O}C

3.4 Organic Carbonate Material Test

Figure 8 is a form of carbonate-organic, that is dolomite and naphthalene mixture, which is ready to be heated.

Fig. 8. Carbonate-Organic Material (dolomite+naftalen)

Figure 9 is the initial heating process at temperature of 400^{O}C which results in a change of color, becomes brighter and soft form. Then it is also produced fluid with muddy color and the clean one. The fluid is a form of oil shale materiall (immature hydrocarbon).

Fig. 9. The heating of organic carbonate material at temperature of 400^{O}C and 500^{O}C

The result of heating at temperature of 500^{O}C is the same as at temperature of 400^{O}C, which results in a change of color, becomes brighter and smoother form. Then it is generated also fluid with muddy color and the clean one. The fluid is a form of oil shale material (immature hydrocarbon).

Fig. 10. The heating of organic carbonate material at temperature of 900^{O}C and 1000^{O}C

Figure 10 shows the heating at T=900^{O}C, which results in a change of color, becomes brighter and more refined form than heating at temperature of 500^{O}C. Then the fluid is produced in humid condition which adheres to the wall of glass tube, in a few hours, the liquid will disappear and leave

the crust (gas). Then the heating at temperature of 1000^{O}C is performed, and the result is the same as the heating at temperature of 900^{O}C.

3.5 Combustion Test of Heating Result Organic Clay and Organic Carbonate

Through the heating tests of organic clay material and organic carbonate, all of the tests produce solid material that changes its color and material in a form of fluid. Then the combustion test is performed immediately on the fluid resulted from the heating process. Combustion test is performed by dripping the mixture of the fluid into charcoal (Figure 11). The result is the charcoal will flare up but it takes a long time.

The dry charcoal which has been dripped with the fluid is difficult to flare up. This is because the sample has low API degree, which means it contains a lot of heavy fractions (high density) and thus its boiling point is high.

Fig. 11. Combustion test on organic clay and organic carbonate

Furthermore the heating result of organic clay and organic carbonate material, which is in a form of fluid, is reheated using furnace (Figure 12).

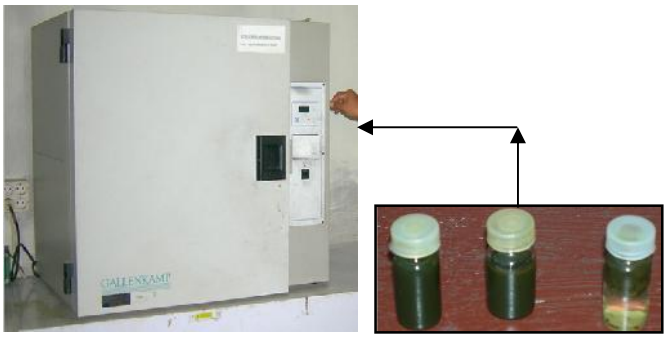


Fig. 12. The heating of organic clay and organic carbonate fluid at temperature of 200^{O}C-400^{O}C

The temperature will affect the fluid, due to the increasing of temperature will change the organic material into hydrocarbon. Figure 13 shows the combustion test on the fluid the result of organic clay and organic carbonate material heating. The result is easy to flare up (such as petroleum), and the flame flares in a quite long time.

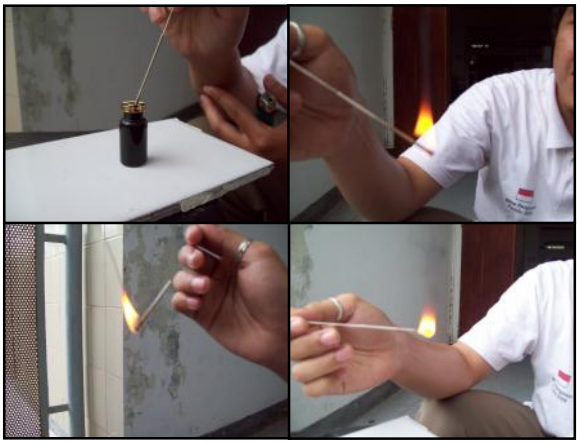


Fig. 13. Combustion test on the fluid the result of organic clay and organic carbonate material

Clay or carbonate material also affects on the time and the value of maximum temperature required in the process of the phase change or the release of water molecule and the molecule contained in the shale material. Carbonate material requires greater time and temperature than clay material does (illite and kaolinite).

It can be seen here that the clay material (kaolinite or illite) has a dominant influence on the process of maturation of organic material (by looking at the value of Tmax) and the phase change (from the result of TGA test), compared to carbonate material (calcite or dolomite). Overall the test results can be employed as an indicator of this research aim.

The time to change the immature organic clay and organic carbonate material into oil and gas (energy source), is determined by the characteristics of the shale material, which are: the immature hydrocrabon subtance has API gravity and and boiling point which is close to petroleum's boiling point; the heating process at temperature of 200^{O}C to 400^{O}C changes the subtance into shale material with low boiling point, this is due to the high degree of its API so it contains more light fractions such as gasoline, thus its boiling point is low. The heating process affects the flash point of the shale material. The process of change requires a short time, it is around ±20 hours, so it is an efficient processing method outside the reservoir, although further research need to be conducted to make it more perfect.

4. CONCLUSION

Based on the outcome of this research, it can be concluded that:

1) The selection of 4 shale materials have been in accordance with the characteristics of oil shale (oil shale) which has good quality with TOC value ≥ 12%, which are 12.02%, 12.42%, 12.57%, 12.86%.
2) The shale material derived from the heating test of organic clay material occurs at temperature of 300-400^{O}C, and for organic carbonate occurs at temperature

of 400-500^{O}C. Meanwhile at temperature of 900-1000^{O}C both materials generate the gas.

3) The heating test on the shale oil at temperature of 200^{O}-400^{O}C changes the material into shale material with low boiling point, it is due to low degree of its API, so the heating process affects the flash point characteristic of the shale material.

REFERENCES

[1] Al-Hamaiedh, H., Maaitah, O., and Mahadin, S. 2010. *Using Oil Shale Ash in Concrete Binder*. EJGE Vol. 15, Bund. F. P. 601-608

[2] AL-Hasan, N. 2006. *Behavior of concrete made using oil shale ash and cement mixtures. Oil Shale*. Vol. 23, No. 2, ISSN: 0208-189X pp. 135–143.

[3] Barkia, H., Belkbir, L. and Jayaweera, S.A.A. 2004. Thermal analysis studies of oil shale residual carbon. *Journal of Thermal Analysis and Calorimetry*, 76 (2), pp.615-622.

[4] Bartis, James T.; LaTourrette, Tom; Dixon, Lloyd; Peterson, D.J.; Cecchine, Gary. 2005. *Oil Shale Development in the United States. Prospects and Policy Issues. Prepared for the National Energy Technology Laboratory of the U.S. Department of Energy.* The RAND Corporation. ISBN: 978-0-8330-3848-7. Retrieved 2007-06-29.

[5] Berraja, T., Barkia, H., Belkbir, L., and Jayaweera, S.A.A. 1988. *Thermal analysis studies of the combustion of Tarfaya oil shale*. Proceeding of an International Conference on Carbon, Carbon'88, Eds. B. McEnnaney and T.J. Mays, Univ. Newcastle Upon Tyne, UK, 18-23.

[6] Burnham, Alan K.; McConaghy, James R. 2006. "*Comparison of the Acceptability of Various Oil Shale Processes*" 26th Oil Shale Symposium. Golden, Colorado: Lawrence Livermore National Laboratory. UCRL-CONF-226717. Retrieved 2007-06-23.

[7] Dewanto, O. 2008. *Organic rocks Shape In The 'X' Central Sumatra, Capacity Estimation Based Thermal Reservoir Rocks.* Proceeding of the National Seminar on Science and Tchnologyi-II 2008 University of Lampung. ISBN: 978-979-1165-74-7. V. 132-141.

[8] Dewanto, O., Bahri, S. and Atmojo, J.P. 2008. *Analysis of Changes in Physical Properties of the Organic Rock Geothermal Flow in Regions 'X' Sumatra, for Determining Content and Regional Oil Shale as an Energy Source*. Proceeding of the Annual Scientific Meeting, HAGI 33rd Annual Convention & Exhibition, Hyatt Regency Bandung. ISBN: 978-979-8126-05-5.

[9] Hermiyanto, M.H. and Ningrum, N.S. *2009*. Organic petrology and Rock-Eval characteristics in selected surficial samples of the Tertiary Formation, South Sumatra Basin. Jurnal Geologi Indonesia, *Vol.4 No.3, p: 215-227.*

[10] Heryanto, R. 2007. Relationship Between Diagenesis, Vitrinite reflectance and Hydrocarbon Maturity Carrier Rocks Sedimentary rocks are Miocene in Bengkulu Basin. *Jurnal Geologi Indonesia*, Vol. 2 No.2. p: 99-111.

[11] Heryanto, R. and Hermiyanto, H. Maret 2006. Potential source rocks (source rock) hydrocarbons in Thirty Mountains, Central Sumatra. *Jurnal Geologi Indonesia*, Vol. 1 No.1, p: 37-48.

[12] Kamtono, Praptisih, and Siregar, M.S. 2005. *Parent rocks Potential Study In Banyumas Sub Basin and North Serayu*. Riset. Geologi dan Pertambangan Vol 16 No.1.

[13] Katz, B.J., 1983. *Limitations of 'Rock-Eval'* pyrolysis for typing organic matter.

[14] Nakayama, K., 1987, '*Hydrocarbon-Expulsion Model and Its Application to Niigata Area Japan*', The American Association of Petroleum Geologists Bulletin, v.71, No.7 July, p. 810-812, 2 Figs.

[15] Nakayama, K., and Lerche, I. 1987, 'Basin Analysis by Model Simulation: Effect of Geologic Parameters on 1D and 2D Fluid Flow Systems with Applications to an Oil Field', *Gulf Coast Assoc. Geol. Soc Trans, v.37, p.175-184.*

[16] Peters, K.E., Walters, C.C., and Moldowan, J.M. 2006. *The biomarker guide: V.1 Biomarkers and isotopes in the environment and human history*. Cambridge University Press, 471 pp.

[17] Qian, Jialin; Wang, Jianqiu. 2006. *World oil shale retorting technologies.* Amman, Jordan. Retrieved 2007-06-29.

[18] Siswoyo & S. Subono, 1995, '*Heat Flow, Hydrocarbon Maturity and Migration in Northwest Java*', *CCOP Technical Bulletin*, March, Vol.25, pp.23 to 36.

[19] Subono, S. & Siswoyo, 1995. *Thermal Studies of Indonesian Oil Basin*. CCOP Technical Bulletin, March 1995, Vol. 25, pp. 37 to 54.

[20] Tjahjono, J.A.E. 2004. *Preliminary Survey on Regional Deposition of Solid Bitumen Sendangharjo Area, Blora, Central Java Province.* DIM, Bandung.

[21] Tobing, S.M. 2003. *Inventory of Solid Bitumen With 'Outcrop Drilling' in Regional Ayah, Kebumen, Central Java Province.* DIM, Bandung.

[22] Widjaya, R.R. 2012. Cr Pillarization Bentonite and Zeolite HZSM-5 Catalyst For Ethanol Conversion Process Being Biogasolin. *Tesis*. Materials Science Program Postgraduate of Faculty of Maths and Science. University of Indonesia.

[23] Yoshioka, H. and Ishiwatari, R. 2002. Characterization of organic matter generated from Green River shale by infrared laser pyrolysis**.** *Geochemical Journal*. Vol. 36, pp. 73 to 82.

International Journals of Engineering & Sciences

IJENS

JOINT VENTURE OF MNA© ENGLAND & DTN© PAKISTAN

IJENS COPYRIGHT FORM

This form is intended for original work submitted to the *International Journal of Engineering n Sciences* and must accompany any such work in order to be published by the IJENS Publisher. Fill in the required information, submit it together with your full paper and must email the copyright form to editor@ijens.org or editor.ijens@gmail.com.

IJENS

E-mail: editor@ijens.org or editor.ijens@gmail.com Web Site: http://www.ijens.org

Journal: ☐IJET ☐$IJV_{IP}N_S$ ☐IJBAS ☐IJCEE ☐IJMME ☐IJECS

Volume: _____ Issue Number: _____

List of Authors / Contributors:

_____

_____

Title of Contribution :

_____

_____

Address:_____

_____

City_____ Province/State _____Country/Zip Code_____

E-mail:_____

It is herein agreed that:

The copyright to the contribution identified above is transferred to IJENS. The copyright transfer covers the exclusive right to reproduce and distribute the contribution, including reprints, translations, photographic reproductions, microform, electronic form, or any other reproductions of similar nature.

The *International Journals of Engineering n Sciences* only publishes articles of the highest quality. When authors decide to submit an article to any of these journals for possible publication, their submissions indicate that the work described in their paper should not have been previously published, or be under consideration for publication elsewhere, in the same or similar form.

The author first warrants that his/her contribution is original, except for such excerpts from copyrighted works as may be included with the permission of the copyright holder and author thereof, that it contains no libelous statements, and does not infringe on any copyright, trademark, patent, statutory right, or propriety right of others.

Author's Signature: _____ **Date**: _____

BNI

Tanggal/*Date* : 18-10-2017

Formulir Kiriman Uang
Remittance Application

IBAN : PK96CBLO0000018499058 01

Penerima / *Beneficiary* ☐ Penduduk/ *Resident* ☐ Bukan Penduduk/ *Non Resident*

Nama/*Name* : International Journals of Engineering & Sciences

Alamat/*Address* : Standard Chartered Bank (Pakistan) Limited 55, Haider Road Branch Saddar

Telepon/*Phone* : Rawalpindi Pakistan

Kota/*City* : Rawalpindi Negara/*Country* : Pakistan

Bank Penerima / *Beneficiary Bank* : Standard Chartered Bank

Kota/*City* : Rawalpindi Negara/*Country* : Pakistan

No. Rek./*Acc. No.* : 01-1849058-01

Pengirim / Remitter ☑ Penduduk/ *Resident** ☐ Bukan Penduduk/ *Non Resident***

Nama/*Name* : ORDAS PEWANTO

Alamat/*Address* : PERUM POLRI CC-14 HAJIMENA - NATAR

Telepon/*Phone* : 081271471554

Kota/*City* : LAMSEL Negara/*Country* : INDONESIA

Keterangan Pembayaran/*Details of Payment* :

Payment for 13MME-IJE.NLS 173105-4848 October 2017

Biaya dari bank koresponden dibebankan ke rekening / *Correspondent bank charges are for account of* :

☐ Penerima/*Beneficiary* ☑ Pengirim/*Remitter* ☐ Sharing

Jenis Pengiriman/ *Type of Transfer* : ☐ LLG/*Clearing* ☐ Draft ☐ .....
☐ RTGS ☑ SWIFT BLPKPKKA

Sumber Dana/*Source of Fund* :
☐ Tunai / *Cash* ☐ Cek / *BG No.* .....
☑ Debit Rek. / *Debit Acc. No.* 0077211115

Mata Uang / *Currency* : ☐ IDR ☐ USD ☐ .....

Jumlah Dana yang Dikirim / *Amount Transfer* :

Jumlah / *Amount*	Kurs / *Rate*	Nilai/*Total Amount*
$ 295		

Terbilang / *Amount in Words* .....

Biaya / *Charge*	Valas / *Amount in Foreign Exchange*	Kurs / *Rate*	Nilai / *Total Amount*
Komisi / *Commission* Pengiriman / *Handling* Bank Koresponden / *Correspondent Bank*			
Jumlah Biaya / *Amount Charge* :			

PT BANK NEGARA INDONESIA (PERSERO) TBK KANTOR CAPEM UNILA

Saya menyetujui sepenuhnya syarat-syarat yang tercantum pada halaman belakang formulir ini / *I unconditionally accept all the terms and conditions on the reverse form.*

ORDAS PEWANTO

Pejabat Bank / *Bank Officer* Teller Pemohon / *Applicant*

Sah jika ada cetakan data komputer atau tanda tangan yang berwenang/*The application form will be valid if there is a computerized validation or the authorized signature.*

* Transaksi oleh penduduk di atas Rp. 100 juta wajib mengisi form P2MN (KYC)/*Transaction by resident amounting over Rp. 100 million must fill in the P2MN (KYC) Form.*
** Transaksi oleh bukan penduduk di atas USD 10.000 atau ekuivalennya wajib mengisi form LLD1/*Transaction by non-resident amounting over US$ 10.000 or its equivalent must fill in the LLD1 form*

Lembar 3 : Nasabah

KMU 1.0/KTK/0706

REFERENCE : S10TKR00039717

NO. TRX. : 53514 974841 96962 TRAN 18/10/2017 10:48:58
NO. REK. : 000000077291115 Bpk ORDAS DEWANTO
JUMLAH : IDR 375,875- 1568
142 - TANJUNG KARANG

NO. TRX. : 53514 974841 96962 TRAN 18/10/2017 10:48:58
NO. REK. : 142360420801001 PENDAPATAN PROPISI KU
JUMLAH : IDR 35,000 1568
142 - TANJUNG KARANG

NO. TRX. : 53514 974841 96962 TRAN 18/10/2017 10:48:58
NO. REK. : 142360482010001 Pendapatan Restitusi B
JUMLAH : IDR 340,875 1568
142 - TANJUNG KARANG

NO. TRX. : 53514 974841 96962 TRAN 18/10/2017 10:48:58
NO. REK. : 000000077291115 Bpk ORDAS DEWANTO
JUMLAH : IDR 3,340,575- 1568
142 - TANJUNG KARANG

NO. TRX. : 53514 974841 96962 TRAN 18/10/2017 10:48:58
NO. REK. : 142840200101001 KU YAKIR
JUMLAH : USD 245 1568
142 - TANJUNG KARANG

PT. BANK NEGARA INDONESIA (Persero), Tbk
CABANG : TANJUNG KARANG

IBOC - Maintenance (S10)

Teller ID : 53514
Date : 18/10/2017
Time : 11:10:43

Sender's Reference:
:20:S10TKR00039717
Bank Operation Code:
:23B:CRED
Value Date/Currency/Interbank Settled Amount:
:32A:171018USD245,
Ordering Customer:
:50K:/0000000077291115
BPK ORDAS DEWANTO
PERUM POLRI C6 NO 14
HAJIMENA NATAR INDONESIA
Ordering Institution:
:52A:BNINIDJAXXX
Account With Institution:
:57D:STANDARD CHARTERED BANK
/STANDARD CHARTERED BANK LIMITED 55
HAIDER ROAD BRANCH
SADDAR RAWALPINDI PAKISTAN
Beneficiary Customer:
:59:/PK96SCBL0000001184905801
INTERNATIONAL JOURNALS OF
ENGINEERING AND SCIENCES
STANDARD CHARTERED BANK LIMITED 55
SADDAR RAWALPINDI PAKISTAN
Remittance Information:
:70:/PAYMENT FOR IJMME-IJENS
//173105-4848 OCTOBER 2017
Details Of Charges:
:71A:OUR
Sender to Receiver Information:
:72:/STANDARD CHARTERED BANK
//STANDARD CHARTERED BANK LIMITED
///HAIDER ROAD BRANCH
////SADDAR RAWALPINDI PAKISTAN
////ACC PK96SCBL0000001184905801
/////SWIFT CODE SCBLPKKXXX

International Journals of Engineering & Sciences

IJENS

IJMME ISSN: 2077-124X (Online)

ISSN: 2227-2771 (Print)

Manuscript Information

Journal Name: **ISSN:**	International Journal of Mechanical & Mechatronics Engineering IJMME / IJENS ISSN: 2077-124X (Online) 2227-2771 (Print)
Manuscript Code:	173105-4848 IJMME / IJENS
Status:	Accept
Authors:	Ordas Dewanto, Bagus S Mulyatno, Rustadi, Rahmat C Wibowo
Manuscript Title:	**Determining the Temperature of Shale Material Conversion Into Crude Oil Based on Organic Clay and Organic Carbonate Test Outside Reservoir**
Abstract:	The amount of shale material in Indonesia is so plentiful, so it is expected in the next few years there will be available many sources of oil and gas. If we wait the process of shale material changes into oil and gas, it obviously will require a long time. Therefore in this reseach, the process of converting shale material into oil and gas will be carried out in the laboratory. The result of its exploration and exploitation, which is in the form of shale material, will be heated to a certain temperature , the content of its organic material reacts and produces energy which can be utilized as fuel as a subtitute of oil and gas. The waste of the process is also very useful for human life. Four shale materials used has a TOC value of ≥ 12%, which are 12.02%, 12.42%, 12.57% and 12.58%. These values are already qualified as oil shale …….
Pages:	07
Tables:	01
Figures:	13
Color Figures:	09
Journal Volume:	17
Journal Issue:	05

SUMMARY OF REVIEWERS COMMENTS

Originality: Accept	Technical Quality: Accept	Significance: Good
Presentation: Accept	Relevance: Accept	Improve English: Yes
Technical Detail: Accept	Need More Figures: Can be	Improve Figures: Yes
Introduction is Adequate: Yes	Improve Critical Discussion: Yes	Technical Accuracy: Accept
Problem Statement & Objective is clear: Yes		Need More References: Yes
Need More Experimental Results: Yes	Need Comparative Evaluation: Yes	
Significance & Broader Impact: Accept	Implication for Industrial Practice: Accept	
Reviewer's Confidence: Accept		

Overall Rating: Accept with Minor Revision

Technical Comments Summary: Paper is well written. Authors have taken very important research objective. It would be great asset for Indonesia if such conversion is possible at low cost. Authors have worked in the lab for conversion into crude oil. In introduction section, authors have referred to researchers work. But authors have not included any latest references. Authors may also look at reports of industries that have successfully converted into crude oil. Authors have experimented at different temperature and presented their results. Authors are also recommended to highlight this area on Google Maps which will be a good source of geographic information for readers. Plagiarism Report is also attached. IJENS Support Staff did initial formatting on behalf of authors so that author(s) can revise their paper easily and send revised formatted paper. Also IJENS Support Staff provide services to improve remaining errors (including formatting errors) on behalf of authors before publication. Overall the paper is accepted for publication in coming issue of journal.

Please **submit only the MS Word file along with bank receipt** so that we can improve the remaining errors. Also provide **physical address alongwith telephone number** for hard copy (+CD) distribution.

FURTHER DETAILS ON PAGE 2

MODES OF SUBMISSION OF PUBLICATION FEE

Kindly choose any mode to submit publication fee to IJENS
http://ijens.org/onlinepaymentmodes.html

MODE 1:

BANK ACCOUNT DETAILS [use Telegraphic Transfer (TT) or Electronic Transfer (ET) or SWIFT]

Publication Fee: **USD $245.00** [online + addition in few databases] **OR**
USD $365.00 [online + addition in few databases + hard copy + courier charges]

in the favour of International Journals of Engineering & Sciences (avoid spelling mistakes)
Account Title: **International Journals of Engineering & Sciences**
Account Number: **01-1849058-01**
Swift Code: **SCBLPKKX**
IBAN = PK96SCBL0000001184905801
Address: **Standard Chartered Bank (Pakistan) Limited**
55, Haider Road Branch, Saddar, Rawalpindi, Pakistan

MODE 2:

E-PAYMENT DETAILS [use Credit Card / PayPal]

Publication Fee: **USD $245.00** [online + addition in few databases] **OR**
USD $365.00 [online + addition in few databases + hard copy + courier charges]

Please visit IJENS Payment Portal by Clicking at the following link
http://online-payments.ijens.website/ to pay the Publication Fee via Credit Card or PayPal.

MODE 3:

INSTANT PAYMENT DETAILS [use Western Union / MoneyGram / Xpress Money]

Publication Fee: **USD $245.00** [online + addition in few databases] **OR**
USD $365.00 [online + addition in few databases + hard copy + courier charges]

Authors can send publication fee through WESTERN UNION, MONEYGRAM or XPRESS MONEY to IJENS. Details of Instant Payment Mode can be provided on demand through email.

International Journals of Engineering & Sciences

IJENS

IJENS Address Form

Please submit your full address on the following lines where you intend to receive your journals' Hard Copy. Fields marked with (*) are MUST to be filled. Fill in the required information and must email it to editor@ijens.org or editor.ijens@gmail.com.

IJENS

E-mail: editor@ijens.org or editor.ijens@gmail.com Web Site: http://www.ijens.org

Journal:* ☐ IJET ☐ IJVIPNS ☐ IJBAS ☐ IJCEE ☐ IJMME ☐ IJECS

Volume:* _____ Issue Number:* _____ M/CODE:* _____

Full Name* (in block capital): _____

Father's Name: _____

Exact Address for Delivery of Hard Copy by the Courier:* _____

_____

_____

_____

Additional Address Info (if any): _____

_____

City (with postal code):* _____

Province/State: _____

Country:* _____

Personal Mobile Number:* _____

Residence Landline Number: _____

Office Landline Number:* _____

Email ID:* _____

It is hereby declared and agreed that:
The information given on the address form is correct in all aspects. And if anybody else receives the hardcopy of the journal on my behalf because of some official/residential constraints, IJENS shall not be held responsible for that. IJENS shall maintain the track record of the shipment and will not be responsible if the shipment is DELIVERED at my given address by anybody else.

Author's Signature: _____ Date: _____

Determining the Temperature of Shale Material Conversion Into Crude Oil Based on Organic Clay and Organic Carbonate Test Outside Reservoir

Ordas Dewanto*,a), Bagus S Mulyanto*,b), Rustadi*,c), Rahmat C Wibowo*,d)

*Geophysics Engineering, Engineering Faculty, University of Lampung, Bandar Lampung 35145, Indonesia

a)ordasdewanto@gmail.com, b)bagusyosodiharjo@yahoo.com, c)rustadi_2007@yahoo.com, d)catur3712@gmail.com

***Abstract*-- The amount of shale material in Indonesia is so plentiful, so it is expected in the next few years there will be available many sources of oil and gas. If we wait the process of shale material changes into oil and gas, it obviously will require a long time. Therefore in this reseach, the process of converting shale material into oil and gas will be carried out in the laboratory. The result of its exploration and exploitation, which is in the form of shale material, will be heated to a certain temperature , the content of its organic material reacts and produces energy which can be utilized as fuel as a subtitute of oil and gas. The waste of the process is also very useful for human life. Four shale materials used has a TOC value of ≥ 12%, which are 12.02%, 12.42%, 12.57% and 12.58%. These values are already qualified as oil shale. The time to change the shale material (organic-clay and organic-carbonate) into oil and gas, is determined by the characteristics of the shale material, which are: immature hydrocarbon substance that has API gravity and boiling point which is close to the boiling point of petroleum. The heating process at temperature of 200^{O}C to 400^{O}C changes the subtance into shale material with low boiling point, this is due to its high API degree so it contains alot of light fractions such as gasoline, hence its boiling point is low. The heating process affects the characteristics of flash point of the shale material. The process of change requires a short time around ±15 hours, so it is very efficient processing method outside reservoir, although further research need to be done to make it more perfect.**

***Index Term*-- shale material, TOC, organic clay, organic carbonate, oil shale**

1. INTRODUCTION

Effort to build laboratory acoustics data to detect the change of organic material properties in the rocks from the result of physics and chemistry properties analysis on reservoir rocks in Indonesia has been conducted by Siswoyo **(**1995), Subono (1995) and Dewanto et al (2002-2004). According to them, the result of measurement and analysis the change of rock chemical properties in the laboratory arises some methods which support this research. The method generated in the research is to determine the maturity of hydrocarbon and its parameter which are used as indicator to predict the level of change in organic material in the rocks (shale material).

In this research, pyrolysis is used to determine organic content (TOC), maturity of organic material, detecting the amount of oil and gas produced and also used to re-identify type of some material mixtures. The heating process is carried out with reference to the method of pyrolysis of previous researchers, which are Katz (1983), Berraja et al (1988), Kamtono, Praptisih and Siregar (2005), Heryanto and Hermiyanto (2006), Hidayat and Fatimah (2007), Praptisih, Kamtono, Putra and Hendrizan (*2009)*, Hermiyanto and Ningrum (*2009).*

Although on the scale of commercial production it will be generated a large anough waste, but apparently according to the theory, the waste can be employed as growing media, road embankment construction materials, cement raw materials. AL-Hasan (2006) has succeeded in doing research on the behavior of concrete made by using oil shale ash and mixture of cement, and the result is incredible, the concrete has a strong and elastic behavior. Another potential of industrial products of oil shale are such as carbon fiber, carbon absorption, black carbon, brick, building decoration, soil fertility, fertilizer and raw material of glass industry. Barkia, Belkbir, and Jayaweera (2004) have conducted a research once again about thermal analysis which was used to determine the effect of heating on oil shale material in Morocco, at temperature of 500°C. A fairly rapid research development, which was originally only conducting combustion without looking at its effect. The result of the research is quite gladdening, encourages the researches to conduct a research development on the shale material, as what has done by Peters, Walters, and Moldowan (2006). Then Al-Hamaiedh, Maaitah, and Mahadin (2010) conducted a research on the result of shale material combined with producing a large amount of ash, then examined the replacement of cement mortar with oil shale ash with a ratio of 10%, 20%, and 30%, which each of them is compared to the strength of mortar cube with pure cement**.** In 2002, Yoshioka and Ishiwatari conducted a research on micropyrolysis infrared laser system for analyzing organic material in the rock, which was then developed and applied on Green River's shale sample. Peters, Walters, and Moldowan, conducted a research on oil shale on shale.

Due to the different condition and observation scale between condition in the laboratory and in the revoir, so conversion of the result of modeling in the laboratory to reservoir condition should be conducted (Nakayama, 1987), with the help of heat capacity at each depth observed to the

laboratory scale which is calibrated, so it can be considered valid in the process of changing shale material into oil and gas.

According to the result of research from Bartis et al (2005), exploitation of shale material that has been collected is sent to a processing place by burning the shale directly to be utilized as source of electrical energy. Bartis et al (2005) also conducted underground shale material mining by applying room and pillar method. Then Burnham et al (2006) extracted the result of shale material processing, which was done on the ground (ex-situ processing), although there were some new technologies to extract the result of shale material processing under ground at the location or at in-situ processing.

To know hydrocarbon potential, shale material type, as well as the level of thermal maturity, chemical-material analysis is performed, namely organic geochemical analysis which is done by conducting *total organic carbon* analysis and also *Rock-Eval pyrolysis* (Tjahjono, 2004 and Tobing, 2003).

The heating test is begun by furnace, then conducted combustion test. The main result of the first test of organic clay and organic carbonate is obtained within the physical changes (color and phase). The exact temperature value is indispensable to change shale material into a solid material, liquid or gas (carbon substance) with a low boiling point. The changing process is expected to require a short time (±20 hours).

2. RESEARCH METHOD

2.1 Material Selection

Started by coring activity at each material which has been known. Picture 1 shows the coring on the material type facies A. Some materials used in this research are clay material (illite), carbonate (dolomite) and organic (naftalen).

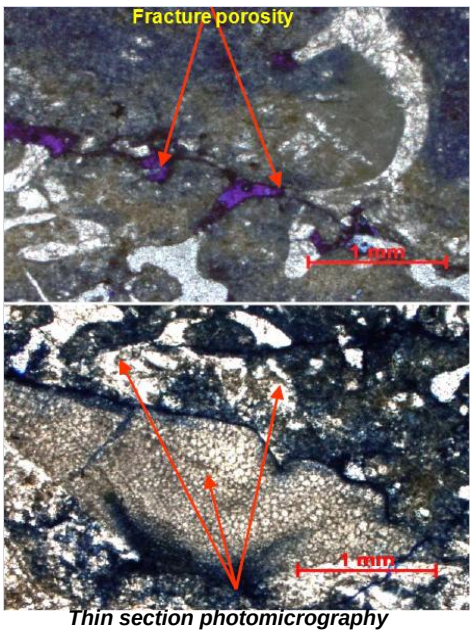


Fig. 1. Type of material taken from the Core Facies A

2.2 Shale Material Type Determination

Firstly, prepare the sample of clay and carbonate material which then are smashed using mechanical tool until it turns into rock powder. After that, do the unification process of the size of the rock powder particle radius by using the sieve which has been measured the size of its radius pores, then weigh.

Secondly, the organic material used is taken into a more specific, which is the organic material group of cyclic compound in the form of naphthalene.

Thirdly, material preparation with desired composition is gotten from composition of organic clay and organic carbonate material. Shale material is shyntesized with a certain ratio combined with the same grain size (Widjaya, 2012), followed by formation process with pres pressure differently to get material that is ready to be analyzed.

2.3 Material Characterization and Test

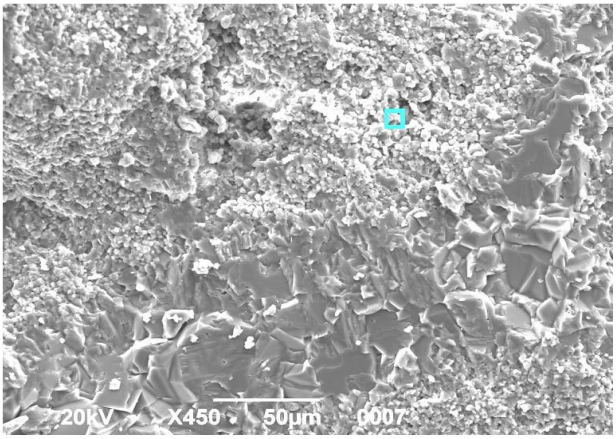
The most important characteristic is shale material that is made, has TOC value ≥ 12, which shows the characteristics of good oil shale used as a reference for comparison. Then to know the distribution of oxide on the surface of the shale, will be analyzed by using X-ray diffraction (XRD). Whereas to know the morphology of the material, it will be analyzed by using SEM analysis. Further, shale material testing is conducted, which is by heating and combustion, so that the temperature of oil shale formation and the change of material into oil and gas can be determined.

3. DISCUSSION

3.1 Result of Material Characterization

Characterization result of SEM and EDAX shows that the clay material type is illite $(Si_7Al)O_{20}(OH)$, it can be seen at Figure 2. Clay material always accompanies the reservoir material containing organic material.

At the time of pyrolysis testing, this material will be added with material organic, so it can be known exactly whether this clay material acts as disturber or otherwise assists the maturation process of organic material in reservoir material.



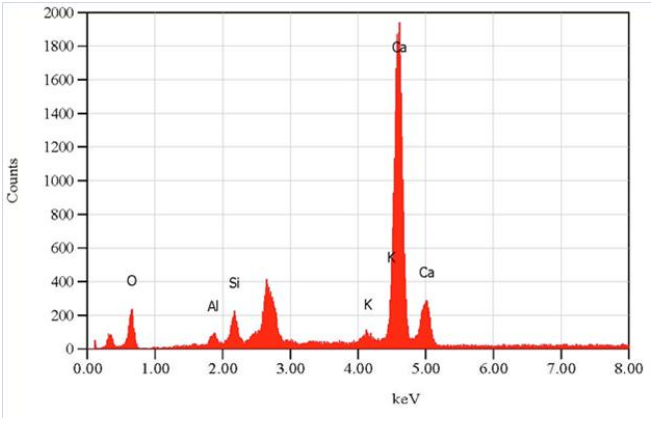
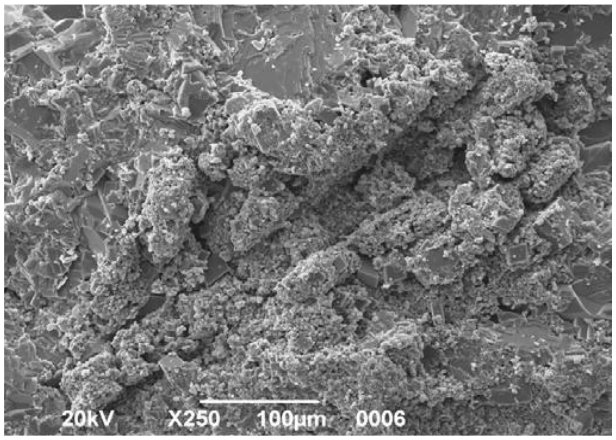


Fig. 2. Clay material type illite

Figure 3 is the result of material characterization which shows carbonate material with the type dolomite [$CaMg(CO_3)_2$]. This is supported by the result of characterization using SEM and Edax analysis.



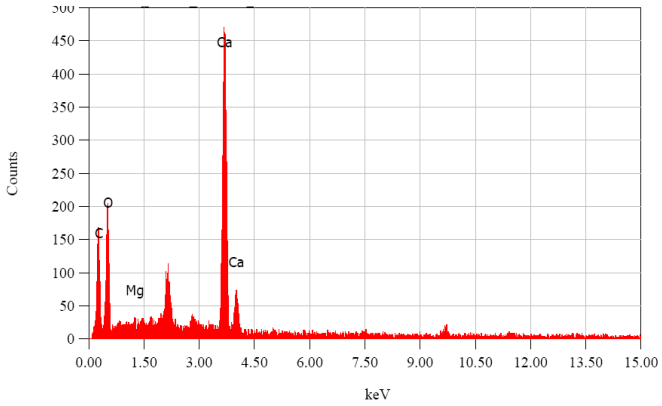


Fig. 3. Material type Dolomite $CaMg(CO_3)_2$

3.2 TOC Analysis

To know hydrocarbon potential, shale material type, as well as the level of thermal maturity, chemical-material analysis is conducted, that is by organic geochemical analysis in the form of *total organic carbon* (TOC). Material characterized in this research is natural clay that has been put together with organic material, which is organic material in the form of naphthalene. Then the natural clay is replaced with natural carbonate which is also incorporated with the organic compound, a compound contained in the shale material (oil shale), so that two shale materials are formed (Organic Clay and Organic Carbonate) which have TOC value $\geq$ 12%. The comparison of organic material with clay or carbonate will affect the organic carbon content and the maximum temperature. In this research, the material properties of clay and carbonate mass are varied and tested. Before the material is selected, characterization is conducted first by using SEM and XRD analysis. Material in the nature contains a variety of substances, chemical compounds and different characteristics, therefore it is necessary to know the material identity. Table I shows the data of TOC testing result on 4 samples of Organic-Clay and Organic-Carbonate.

Table I
TOC Data and Pyrolysis

Sample Name	TOC (%)
Sample-1 (Organic Clay)	12,02
Sample-2 (Organic Clay)	12,42
Sample-3 (Organic Carbonate)	12,57
Sample-4 (Organic Carbonate)	12,86

Furthermore, both of shale materials (Organic-Clay and Organic-Carbonate), which have been characterized by using a variety of methods, will produce physical and chemical properties information. Beside that it can be obtained some laboratory test parameters and conceived in detail the mechanism of oil shale reaction model into crude oil.

3.3 Organic Clay Material Test

Figure 4 is organic clay material, that is illite and naphthalene mixture, which is ready to be heated.

Fig. 4. Organic clay material (illite+naftalen)

The heating at temperature of 300^{O}C produces a color change becomes brighter, cleaner and the form is smoother. Then it also produces fluid in two conditions, the muddy color and the clean one. The fluid is a form of oil shale material (immature hydrocarbon). It is shown at Figure 5.

Fig. 5. The heating of organic clay at T=300^{O}C

Figure 6 shows the heating at T=400^{O}C, which results in a change of color becomes brighter, cleaner and the form is smoother than the heating at temperature of 300^{O}C. Then it also produces fluid in two conditions, the muddy color and the clean one. The fluid is a form of shale oil material (immature hydrocarbon or crude oil).

Fig. 6. The heating of organic clay at T=400^{O}C

Figure 7 shows the heating at T=1000^{O}C, which results in a change of color becomes brighter and the form is smoother than the heating at 400^{O}C. Then it is also produced fluid in humid condition which adheres at the wall of glass tube, in a few hours, the liquid will disappear and leave crust (gas).

Fig. 7. The heating of organic clay at T=1000^{O}C

3.4 Organic Carbonate Material Test

Figure 8 is a form of carbonate-organic, that is dolomite and naphthalene mixture, which is ready to be heated.

Fig. 8. Carbonate-Organic Material (dolomite+naftalen)

Figure 9 is the initial heating process at temperature of 400^{O}C which results in a change of color, becomes brighter and soft form. Then it is also produced fluid with muddy color and the clean one. The fluid is a form of oil shale materiall (immature hydrocarbon).

Fig. 9. The heating of organic carbonate material at temperature of 400^{O}C and 500^{O}C

The result of heating at temperature of 500^{O}C is the same as at temperature of 400^{O}C, which results in a change of color, becomes brighter and smoother form. Then it is generated also fluid with muddy color and the clean one. The fluid is a form of oil shale material (immature hydrocarbon).

Fig. 10. The heating of organic carbonate material at temperature of 900^{O}C and 1000^{O}C

Figure 10 shows the heating at T=900^{O}C, which results in a change of color, becomes brighter and more refined form than heating at temperature of 500^{O}C. Then the fluid is produced in humid condition which adheres to the wall of glass tube, in a few hours, the liquid will disappear and leave

the crust (gas). Then the heating at temperature of 1000^{O}C is performed, and the result is the same as the heating at temperature of 900^{O}C.

3.5 Combustion Test of Heating Result Organic Clay and Organic Carbonate

Through the heating tests of organic clay material and organic carbonate, all of the tests produce solid material that changes its color and material in a form of fluid. Then the combustion test is performed immediately on the fluid resulted from the heating process. Combustion test is performed by dripping the mixture of the fluid into charcoal (Figure 11). The result is the charcoal will flare up but it takes a long time.

The dry charcoal which has been dripped with the fluid is difficult to flare up. This is because the sample has low API degree, which means it contains a lot of heavy fractions (high density) and thus its boiling point is high.

Fig. 11. Combustion test on organic clay and organic carbonate

Furthermore the heating result of organic clay and organic carbonate material, which is in a form of fluid, is reheated using furnace (Figure 12).

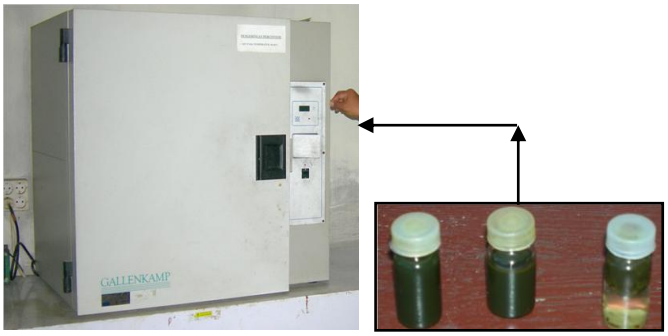


Fig. 12. The heating of organic clay and organic carbonate fluid at temperature of 200^{O}C-400^{O}C

The temperature will affect the fluid, due to the increasing of temperature will change the organic material into hydrocarbon. Figure 13 shows the combustion test on the fluid the result of organic clay and organic carbonate material heating. The result is easy to flare up (such as petroleum), and the flame flares in a quite long time.

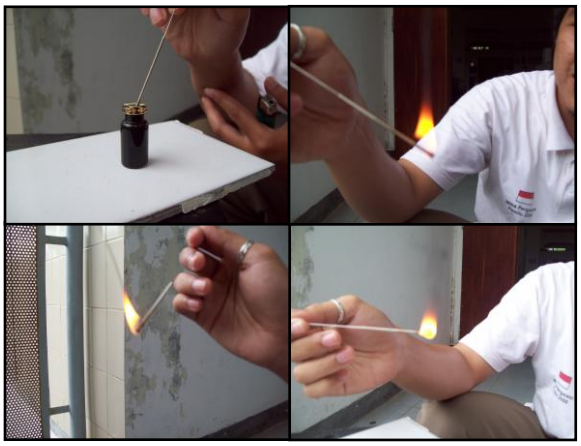


Fig. 13. Combustion test on the fluid the result of organic clay and organic carbonate material

Clay or carbonate material also affects on the time and the value of maximum temperature required in the process of the phase change or the release of water molecule and the molecule contained in the shale material. Carbonate material requires greater time and temperature than clay material does (illite and kaolinite).

It can be seen here that the clay material (kaolinite or illite) has a dominant influence on the process of maturation of organic material (by looking at the value of Tmax) and the phase change (from the result of TGA test), compared to carbonate material (calcite or dolomite). Overall the test results can be employed as an indicator of this research aim.

The time to change the immature organic clay and organic carbonate material into oil and gas (energy source), is determined by the characteristics of the shale material, which are: the immature hydrocrabon subtance has API gravity and and boiling point which is close to petroleum's boiling point; the heating process at temperature of 200^{O}C to 400^{O}C changes the subtance into shale material with low boiling point, this is due to the high degree of its API so it contains more light fractions such as gasoline, thus its boiling point is low. The heating process affects the flash point of the shale material. The process of change requires a short time, it is around ±20 hours, so it is an efficient processing method outside the reservoir, although further research need to be conducted to make it more perfect.

4. CONCLUSION

Based on the outcome of this research, it can be concluded that:

1) The selection of 4 shale materials have been in accordance with the characteristics of oil shale (oil shale) which has good quality with TOC value ≥ 12%, which are 12.02%, 12.42%, 12.57%, 12.86%.
2) The shale material derived from the heating test of organic clay material occurs at temperature of 300-400^{O}C, and for organic carbonate occurs at temperature

of 400-500^{O}C. Meanwhile at temperature of 900-1000^{O}C both materials generate the gas.

3) The heating test on the shale oil at temperature of 200^{O}-400^{O}C changes the material into shale material with low boiling point, it is due to low degree of its API, so the heating process affects the flash point characteristic of the shale material.

REFERENCES

[1] Al-Hamaiedh, H., Maaitah, O., and Mahadin, S. 2010. *Using Oil Shale Ash in Concrete Binder*. EJGE Vol. 15, Bund. F. P. 601-608

[2] AL-Hasan, N. 2006. *Behavior of concrete made using oil shale ash and cement mixtures. Oil Shale*. Vol. 23, No. 2, ISSN: 0208-189X pp. 135–143.

[3] Barkia, H., Belkbir, L. and Jayaweera, S.A.A. 2004. Thermal analysis studies of oil shale residual carbon. *Journal of Thermal Analysis and Calorimetry*, 76 (2), pp.615-622.

[4] Bartis, James T.; LaTourrette, Tom; Dixon, Lloyd; Peterson, D.J.; Cecchine, Gary. 2005. *Oil Shale Development in the United States. Prospects and Policy Issues. Prepared for the National Energy Technology Laboratory of the U.S. Department of Energy.* The RAND Corporation. ISBN: 978-0-8330-3848-7. Retrieved 2007-06-29.

[5] Berraja, T., Barkia, H., Belkbir, L., and Jayaweera, S.A.A. 1988. *Thermal analysis studies of the combustion of Tarfaya oil shale*. Proceeding of an International Conference on Carbon, Carbon'88, Eds. B. McEnnaney and T.J. Mays, Univ. Newcastle Upon Tyne, UK, 18-23.

[6] Burnham, Alan K.; McConaghy, James R. 2006. "*Comparison of the Acceptability of Various Oil Shale Processes*" 26th Oil Shale Symposium. Golden, Colorado: Lawrence Livermore National Laboratory. UCRL-CONF-226717. Retrieved 2007-06-23.

[7] Dewanto, O. 2008. *Organic rocks Shape In The 'X' Central Sumatra, Capacity Estimation Based Thermal Reservoir Rocks*. Proceeding of the National Seminar on Science and Tchnologyi-II 2008 University of Lampung. ISBN: 978-979-1165-74-7. V. 132-141.

[8] Dewanto, O., Bahri, S. and Atmojo, J.P. 2008. *Analysis of Changes in Physical Properties of the Organic Rock Geothermal Flow in Regions 'X' Sumatra, for Determining Content and Regional Oil Shale as an Energy Source*. Proceeding of the Annual Scientific Meeting, HAGI 33rd Annual Convention & Exhibition, Hyatt Regency Bandung. ISBN: 978-979-8126-05-5.

[9] Hermiyanto, M.H. and Ningrum, N.S. *2009.* Organic petrology and Rock-Eval characteristics in selected surficial samples of the Tertiary Formation, South Sumatra Basin. Jurnal Geologi Indonesia, *Vol.4 No.3, p: 215-227.*

[10] Heryanto, R. 2007. Relationship Between Diagenesis, Vitrinite reflectance and Hydrocarbon Maturity Carrier Rocks Sedimentary rocks are Miocene in Bengkulu Basin. *Jurnal Geologi Indonesia*, Vol. 2 No.2. p: 99-111.

[11] Heryanto, R. and Hermiyanto, H. Maret 2006. Potential source rocks (source rock) hydrocarbons in Thirty Mountains, Central Sumatra. *Jurnal Geologi Indonesia*, Vol. 1 No.1, p: 37-48.

[12] Kamtono, Praptisih, and Siregar, M.S. 2005. *Parent rocks Potential Study In Banyumas Sub Basin and North Serayu*. Riset. Geologi dan Pertambangan Vol 16 No.1.

[13] Katz, B.J., 1983. *Limitations of 'Rock-Eval'* pyrolysis for typing organic matter.

[14] Nakayama, K., 1987, '*Hydrocarbon-Expulsion Model and Its Application to Niigata Area Japan*', The American Association of Petroleum Geologists Bulletin, v.71, No.7 July, p. 810-812, 2 Figs.

[15] Nakayama, K., and Lerche, I. 1987, 'Basin Analysis by Model Simulation: Effect of Geologic Parameters on 1D and 2D Fluid Flow Systems with Applications to an Oil Field', *Gulf Coast Assoc. Geol. Soc Trans, v.37, p.175-184.*

[16] Peters, K.E., Walters, C.C., and Moldowan, J.M. 2006. *The biomarker guide: V.1 Biomarkers and isotopes in the environment and human history*. Cambridge University Press, 471 pp.

[17] Qian, Jialin; Wang, Jianqiu. 2006. *World oil shale retorting technologies.* Amman, Jordan. Retrieved 2007-06-29.

[18] Siswoyo & S. Subono, 1995, '*Heat Flow, Hydrocarbon Maturity and Migration in Northwest Java*', *CCOP Technical Bulletin*, March, Vol.25, pp.23 to 36.

[19] Subono, S. & Siswoyo, 1995. *Thermal Studies of Indonesian Oil Basin*. CCOP Technical Bulletin, March 1995, Vol. 25, pp. 37 to 54.

[20] Tjahjono, J.A.E. 2004. *Preliminary Survey on Regional Deposition of Solid Bitumen Sendangharjo Area, Blora, Central Java Province.* DIM, Bandung.

[21] Tobing, S.M. 2003. *Inventory of Solid Bitumen With 'Outcrop Drilling' in Regional Ayah, Kebumen, Central Java Province.* DIM, Bandung.

[22] Widjaya, R.R. 2012. Cr Pillarization Bentonite and Zeolite HZSM-5 Catalyst For Ethanol Conversion Process Being Biogasolin. *Tesis*. Materials Science Program Postgraduate of Faculty of Maths and Science. University of Indonesia.

[23] Yoshioka, H. and Ishiwatari, R. 2002. Characterization of organic matter generated from Green River shale by infrared laser pyrolysis**.** *Geochemical Journal*. Vol. 36, pp. 73 to 82.