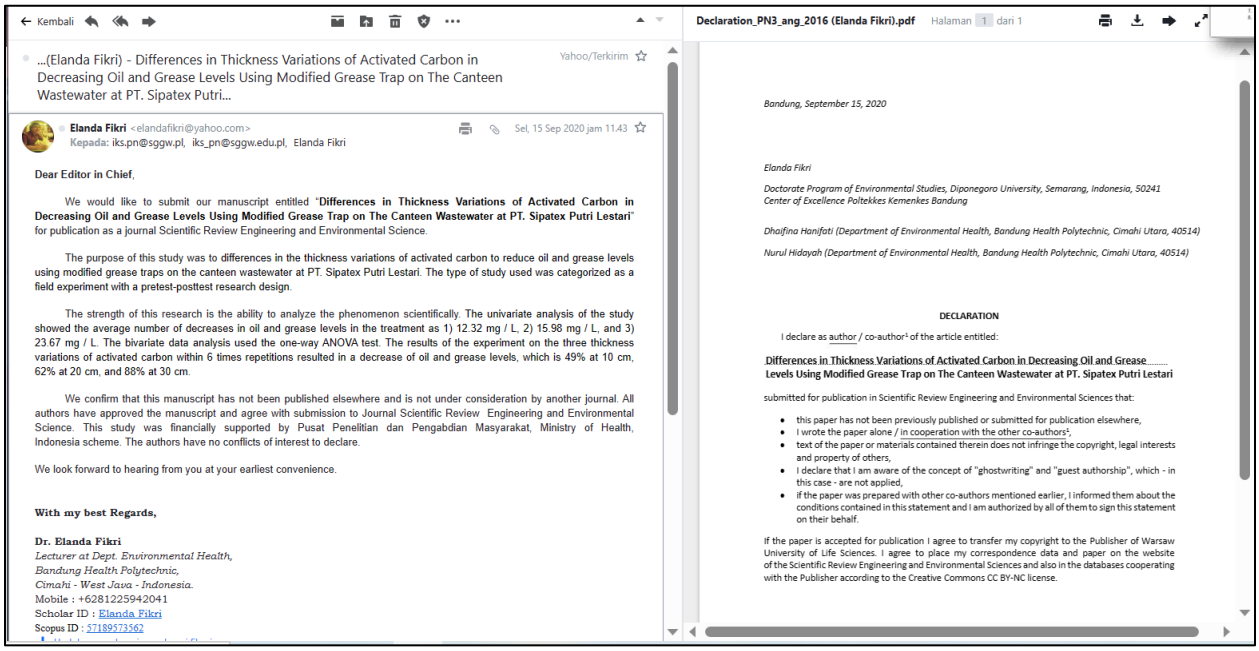
BUKTI KORESPONDENSI

Nama : Dr. Elanda Fikri, S.KM., M.Kes
NIP : 198903112015031002
NIDN : 4011038901
Jabatan : Lektor Kepala
Unit Kerja : Poltekkes Kemenkes Bandung

Jurnal internasional bereputasi (terindeks pada database internasional bereputasi dan berfaktor dampak) Penulis pertama : (60%x40=24)	Differences in thickness variations of activated carbon in decreasing oil and grease levels using modified grease trap on the canteen wastewater	Scientific Review Engineering and Environmental Sciences, Volume 30, Issue 1, 2021, Pages 106-116, Penulis pertama, ISSN: 17329353, Publisher: WULS - SGGW Press, SCOPUS Q4, (**Elanda Fikri**, Dhaifina Hanifati, Nurul Hidayah) Link DOI : https://doi.org/10.22630/PNIKS.2021.30.1.10 Link WEB : https://srees.sggw.edu.pl/article/view/122 URL DOKUMEN : https://srees.sggw.edu.pl/article/view/122/81 URL H-INDEKS/SJR: https://www.scimagojr.com/journalsearch.php?q=21100238408&tip=sid&clean=0 URL SIMILARITY : https://repo.poltekkesbandung.ac.id/5752/1/Dhiference%20Thicknes%20Turnitin.pdf

SUBMIT PAPER (15 SEPTEMBER 2020)



Kembali

...(Elanda Fikri) - Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri...

Yahoo/Terkirim

Elanda Fikri <elandafikri@yahoo.com>
Kepada: iks.pn@sggw.pl, iks_pn@sggw.edu.pl, Elanda Fikri

Sel, 15 Sep 2020 jam 11.43

Dear Editor in Chief,

We would like to submit our manuscript entitled "**Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri Lestari**" for publication as a journal Scientific Review Engineering and Environmental Science.

The purpose of this study was to differences in the thickness variations of activated carbon to reduce oil and grease levels using modified grease traps on the canteen wastewater at PT. Sipatex Putri Lestari. The type of study used was categorized as a field experiment with a pretest-posttest research design.

The strength of this research is the ability to analyze the phenomenon scientifically. The univariate analysis of the study showed the average number of decreases in oil and grease levels in the treatment as 1) 12.32 mg / L, 2) 15.98 mg / L, and 3) 23.67 mg / L. The bivariate data analysis used the one-way ANOVA test. The results of the experiment on the three thickness variations of activated carbon within 6 times repetitions resulted in a decrease of oil and grease levels, which is 49% at 10 cm, 62% at 20 cm, and 88% at 30 cm.

We confirm that this manuscript has not been published elsewhere and is not under consideration by another journal. All authors have approved the manuscript and agree with submission to Journal Scientific Review Engineering and Environmental Science. This study was financially supported by Pusat Penelitian dan Pengabdian Masyarakat, Ministry of Health, Indonesia scheme. The authors have no conflicts of interest to declare.

We look forward to hearing from you at your earliest convenience.

With my best Regards,

Dr. Elanda Fikri
Lecturer at Dept. Environmental Health,
Bandung Health Polytechnic,
Cimahi - West Java - Indonesia.
Mobile : +6281225942041
Scholar ID : Elanda Fikri
Scopus ID : 57189573562

Declaration_PN3_ang_2016 (Elanda Fikri).pdf Halaman 1 dari 1

Bandung, September 15, 2020

Elanda Fikri
Doctorate Program of Environmental Studies, Diponegoro University, Semarang, Indonesia, 50241
Center of Excellence Poltekkes Kemenkes Bandung

Dhaifina Hanifati (Department of Environmental Health, Bandung Health Polytechnic, Cimahi Utara, 40514)
Nurul Hidayah (Department of Environmental Health, Bandung Health Polytechnic, Cimahi Utara, 40514)

DECLARATION

I declare as author / co-author[1] of the article entitled:

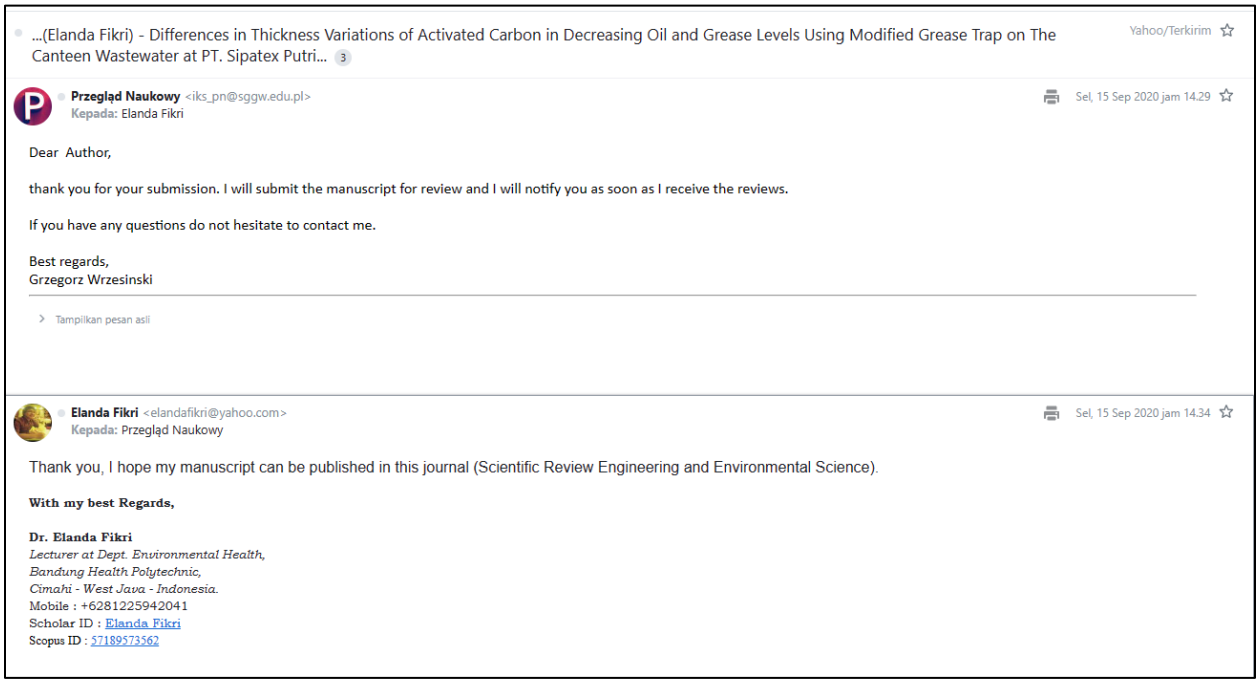
Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri Lestari

submitted for publication in Scientific Review Engineering and Environmental Sciences that:

- this paper has not been previously published or submitted for publication elsewhere,
- I wrote the paper alone / in cooperation with the other co-authors[1],
- text of the paper or materials contained therein does not infringe the copyright, legal interests and property of others,
- I declare that I am aware of the concept of "ghostwriting" and "guest authorship", which - in this case - are not applied,
- if the paper was prepared with other co-authors mentioned earlier, I informed them about the conditions contained in this statement and I am authorized by all of them to sign this statement on their behalf.

If the paper is accepted for publication I agree to transfer my copyright to the Publisher of Warsaw University of Life Sciences. I agree to place my correspondence data and paper on the website of the Scientific Review Engineering and Environmental Sciences and also in the databases cooperating with the Publisher according to the Creative Commons CC BY-NC license.

MANUSKRIP SUDAH DITERIMA OLEH EDITOR IN CHIEF DAN SIAP UNTUK DIREVIEW (15 September 2020)



...(Elanda Fikri) - Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri... 3

Yahoo/Terkirim

Przegląd Naukowy <iks_pn@sggw.edu.pl>
Kepada: Elanda Fikri

Sel, 15 Sep 2020 jam 14.29

Dear Author,

thank you for your submission. I will submit the manuscript for review and I will notify you as soon as I receive the reviews.

If you have any questions do not hesitate to contact me.

Best regards,
Grzegorz Wrzesinski

Tampilkan pesan asli

Elanda Fikri <elandafikri@yahoo.com>
Kepada: Przegląd Naukowy

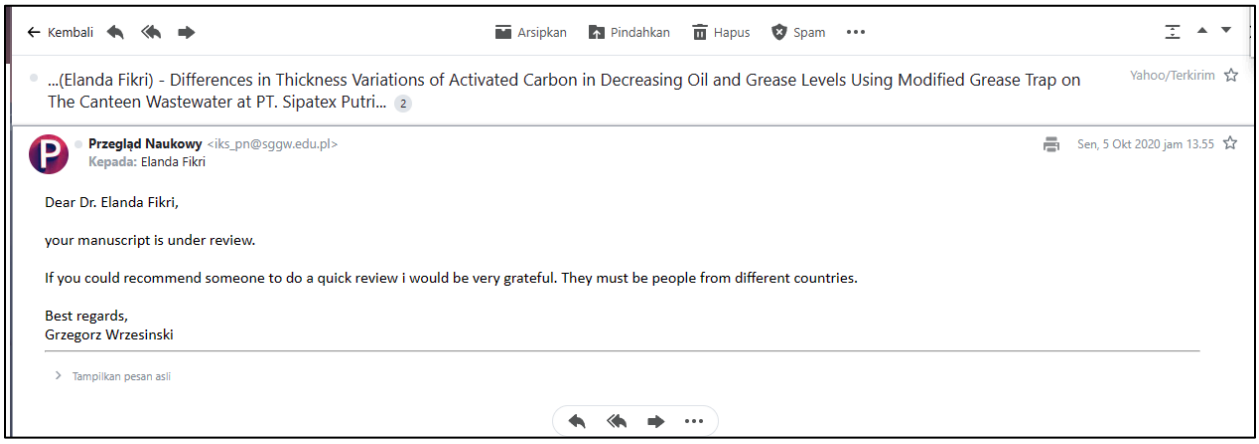
Sel, 15 Sep 2020 jam 14.34

Thank you, I hope my manuscript can be published in this journal (Scientific Review Engineering and Environmental Science).

With my best Regards,

Dr. Elanda Fikri
Lecturer at Dept. Environmental Health,
Bandung Health Polytechnic,
Cimahi - West Java - Indonesia.
Mobile : +6281225942041
Scholar ID : Elanda Fikri
Scopus ID : 57189573562

UNDER REVIEW



Kembali Arsipkan Pindahkan Hapus Spam

...(Elanda Fikri) - Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri... 2

Yahoo/Terkirim

Przegląd Naukowy <iks_pn@sggw.edu.pl>
Kepada: Elanda Fikri

Sen, 5 Okt 2020 jam 13.55

Dear Dr. Elanda Fikri,

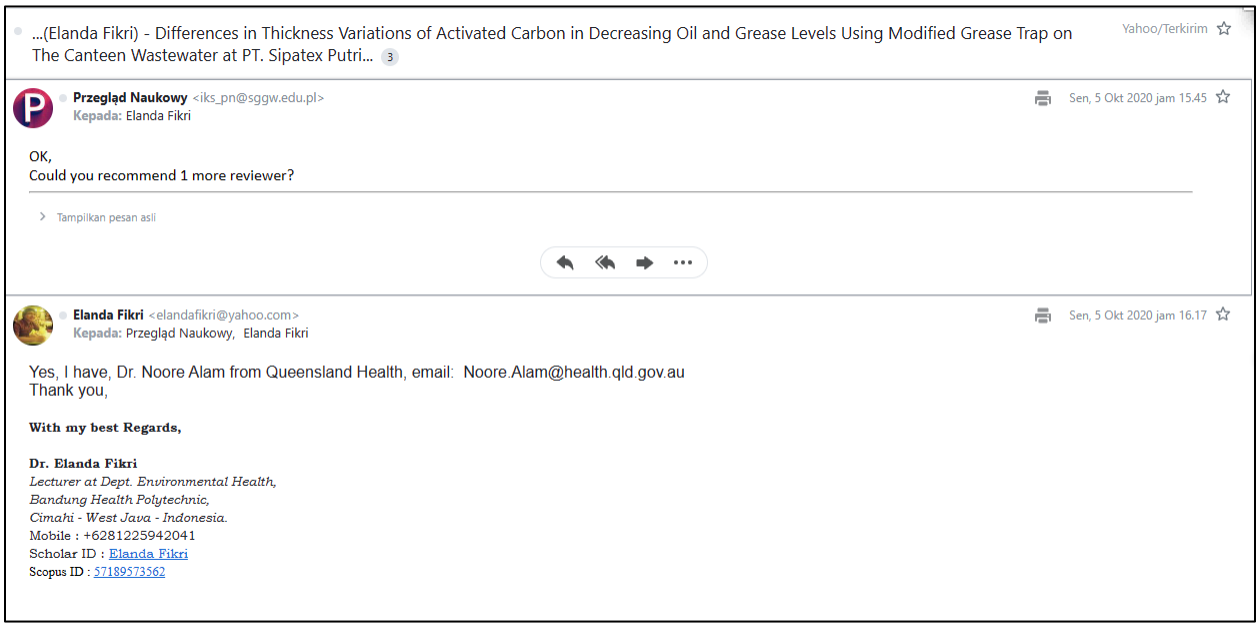
your manuscript is under review.

If you could recommend someone to do a quick review i would be very grateful. They must be people from different countries.

Best regards,
Grzegorz Wrzesinski

Tampilkan pesan asli

EDITOR IN CHIEF MEMINTA 1 REVIEWER KEMBALI (5 Oktober 2020)



...(Elanda Fikri) - Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri... 3

Yahoo/Terkirim

Przegląd Naukowy <iks_pn@sggw.edu.pl>
Kepada: Elanda Fikri

Sen, 5 Okt 2020 jam 15.45

OK,
Could you recommend 1 more reviewer?

Tampilkan pesan asli

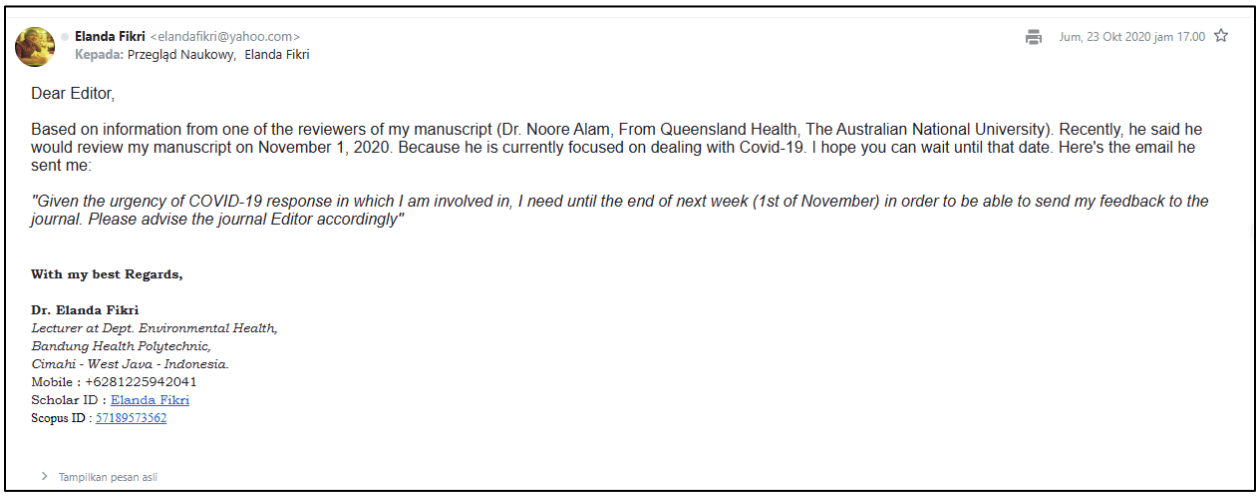
Elanda Fikri <elandafikri@yahoo.com>
Kepada: Przegląd Naukowy, Elanda Fikri

Sen, 5 Okt 2020 jam 16.17

Yes, I have, Dr. Noore Alam from Queensland Health, email: Noore.Alam@health.qld.gov.au
Thank you,

With my best Regards,

Dr. Elanda Fikri
Lecturer at Dept. Environmental Health,
Bandung Health Polytechnic,
Cimahi - West Java - Indonesia.
Mobile : +6281225942041
Scholar ID : Elanda Fikri
Scopus ID : 57189573562



Elanda Fikri <elandafikri@yahoo.com>
Kepada: Przegląd Naukowy, Elanda Fikri

Jum, 23 Okt 2020 jam 17.00

Dear Editor,

Based on information from one of the reviewers of my manuscript (Dr. Noore Alam, From Queensland Health, The Australian National University). Recently, he said he would review my manuscript on November 1, 2020. Because he is currently focused on dealing with Covid-19. I hope you can wait until that date. Here's the email he sent me:

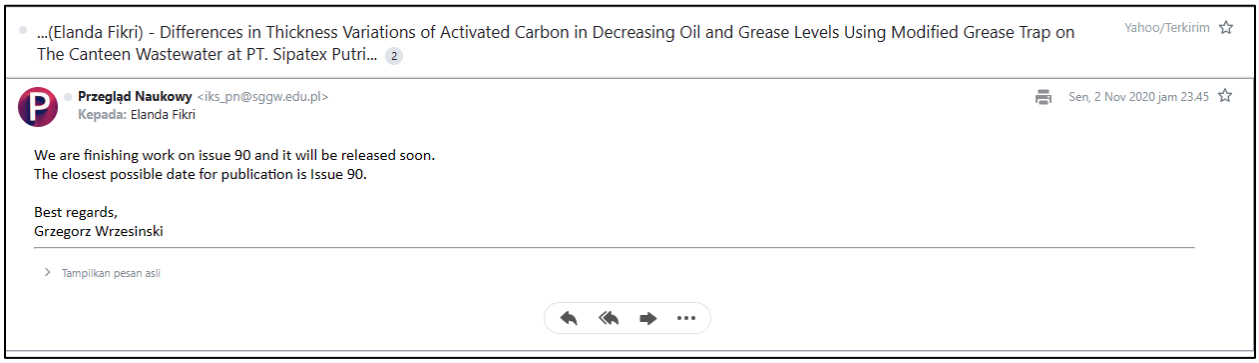
"Given the urgency of COVID-19 response in which I am involved in, I need until the end of next week (1st of November) in order to be able to send my feedback to the journal. Please advise the journal Editor accordingly"

With my best Regards,

Dr. Elanda Fikri
Lecturer at Dept. Environmental Health,
Bandung Health Polytechnic,
Cimahi - West Java - Indonesia.
Mobile : +6281225942041
Scholar ID : Elanda Fikri
Scopus ID : 57189573562

Tampilkan pesan asli

MENDAPAT INFO DARI EDITOR IN CHIEF (2 NOVEMBER 2020)



...(Elanda Fikri) - Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri... 2

Yahoo/Terkirim

Przegląd Naukowy <iks_pn@sggw.edu.pl>
Kepada: Elanda Fikri

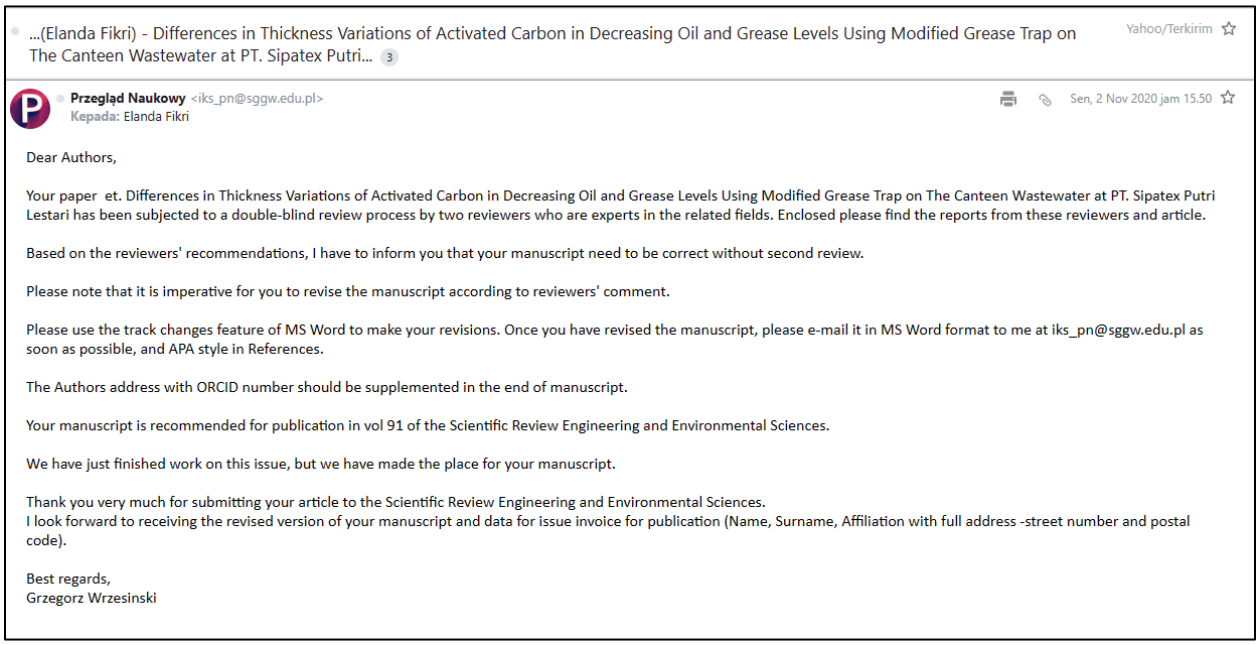
Sen, 2 Nov 2020 jam 23.45

We are finishing work on issue 90 and it will be released soon.
The closest possible date for publication is Issue 90.

Best regards,
Grzegorz Wrzesinski

Tampilkan pesan asli

MENDAPATKAN KOMENTAR DARI REVIEWER (2 November 2020)



...(Elanda Fikri) - Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri... 3

Yahoo/Terkirim

Przegląd Naukowy <iks_pn@sggw.edu.pl>
Kepada: Elanda Fikri

Sen, 2 Nov 2020 jam 15.50

Dear Authors,

Your paper et. Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri Lestari has been subjected to a double-blind review process by two reviewers who are experts in the related fields. Enclosed please find the reports from these reviewers and article.

Based on the reviewers' recommendations, I have to inform you that your manuscript need to be correct without second review.

Please note that it is imperative for you to revise the manuscript according to reviewers' comment.

Please use the track changes feature of MS Word to make your revisions. Once you have revised the manuscript, please e-mail it in MS Word format to me at iks_pn@sggw.edu.pl as soon as possible, and APA style in References.

The Authors address with ORCID number should be supplemented in the end of manuscript.

Your manuscript is recommended for publication in vol 91 of the Scientific Review Engineering and Environmental Sciences.

We have just finished work on this issue, but we have made the place for your manuscript.

Thank you very much for submitting your article to the Scientific Review Engineering and Environmental Sciences.
I look forward to receiving the revised version of your manuscript and data for issue invoice for publication (Name, Surname, Affiliation with full address -street number and postal code).

Best regards,
Grzegorz Wrzesinski

SUBMIT HASIL REVIEW (2 November 2020)

Elanda Fikri <elandafikri@yahoo.com>
Kepada: iks_pn@sggw.edu.pl, Elanda Fikri

Sen, 2 Nov 2020 jam 22.08

Dear Editor,

Thank you for submitting the reviews from the reviewers. I will immediately finish revising this manuscript. I read this manuscript is recommended to be published in vol 91? Meanwhile, at this time, I saw it on the website that it was only published until vol 29. Will it not be published in the near future? I think this is too long (only 4 times published per year). Please consider it.

With my best Regards,

With my best Regards,

Dr. Elanda Fikri
Lecturer at Dept. Environmental Health,
Bandung Health Polytechnic,
Cimahi - West Java - Indonesia.
Mobile : +6281225942041
Scholar ID : Elanda Fikri
Scopus ID : 57189573562

Tampilkan pesan asli

Elanda Fikri <elandafikri@yahoo.com>
Kepada: Przegląd Naukowy, Elanda Fikri

Sab, 7 Nov 2020 jam 20.35

Dear Editor,
I have finished revising the manuscript, based on feedback from reviewers. Please check again. Hopefully, it is appropriate. I hope it will be published in this journal soon.

With my best Regards,

Dr. Elanda Fikri
Lecturer at Dept. Environmental Health,
Bandung Health Polytechnic,
Cimahi - West Java - Indonesia.
Mobile : +6281225942041
Scholar ID : Elanda Fikri
Scopus ID : 57189573562

← Kembali

Elanda Fikri <elandafikri@yahoo.com>
Kepada: Przegląd Naukowy, Elanda Fikri

Sab, 7 Nov 2020 jam 20.35

Dear Editor,
I have finished revising the manuscript, based on feedback from reviewers. Please check again. Hopefully, it is appropriate. I hope it will be published in this journal soon.

With my best Regards,

Dr. Elanda Fikri
Lecturer at Dept. Environmental Health,
Bandung Health Polytechnic,
Cimahi - West Java - Indonesia.
Mobile : +6281225942041
Scholar ID : Elanda Fikri
Scopus ID : 57189573562

Tampilkan pesan asli

Unduh semua lampiran sebagai file zip

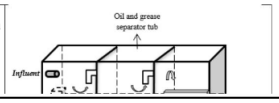
Manuscrip... .docx
162.6kB

REVISION ... .docx
111.8kB

Balas, Balas ke Semua atau Teruskan

REVISION TABLE.docx Halaman 1 dari 3

REVISION TABLE

No	Reviewer Comments	Revision or Comment
1	Line 19: replace the whole name of the regulation by "The above regulation".	….organic chemistry includes oil and grease, and biological characteristics such as total coliform according to the above regulation (line 23).
2	Line 21: instead of repeating the name of the regulation, use this a reference	…water bodies as a result of either or both industrial activities and non-industrial activities, according to the above regulation. (line 28)
3	Line 31-32: unclear whether this statement refers to Indonesia or Globally	Oil and grease are one source of contaminants that have not been handled properly In Indonesia (Abuzar et al., 2012). (line 28-29)
4	Line 68-69: The sentence is unclear '…trap will be passed through…', which research this statement is referring to?	Not by reference, but this is a step/procedure in this research.
5	Line 76 : what is 'Van Der Waals Force? This require an explanation	The van der Waals force is founded on the recognition that spontaneous, transient electric polarization can arise at a center due to the motion of electrons, molecular distortion, or molecular orientation. This polarization will act on the surrounding region to perturb spontaneous fluctuations elsewhere (Ninham and Parsegian, 1970). (Line 80-83). Reference (Line 321-323)
6	Line 79: "Based on this research.." which research?	Research conducted by the author.
7	Line 118 : Concentrate on your research instead of saying "this type of research"	Concentrate on research used True Experiment Pretest Posttest Without Control (Line 125-126)
8	Table 1: "1 inch, 2 inch,' need to say if they are diameter or something else. Also, 'Im' should be in full (1 metre).	Tools/Materials / Size / Quantity Grease trap: 90x30x40 (30x30x40 of each chamber): 1 Pipe: 0.0254 m: 1 m Pipe: 0.0508 m: 1 m T Pipe: 0.0508 m: 2 Grill Flat: : 0.5 m Jerrycan: 5 l: 10 Activated Carbon: 10 kg: - Canteen: 100 l: - Wastewater Sample: :
9	Figure 1: the authors need to explain the figure in more details. It is important to say if this is their primary work. If it was used elsewhere, they need to say so with due acknowledgement to the source and reference. If this is built upon previous work, that should also be acknowledged and referenced.	

REVISION TABLE :

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<table>
<tr><th>No</th><th>Reviewer Comments</th><th>Revision or Comment</th></tr>
<tr><td>1</td><td>Line 19: replace the whole name of the regulation by “The above regulation”.</td><td>…..organic chemistry includes oil and grease, and biological characteristics such as total coliform according to the above regulation (line 23).</td></tr>
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<tr><td>3</td><td>Line 31-32: unclear whether this statement refers to Indonesia or Globally</td><td>Oil and grease are one source of contaminants that have not been handled properly In Indonesia (Abuzar et al., 2012). (line 28-29)</td></tr>
<tr><td>4</td><td>Line 68-69: The sentence is unclear ‘….trap will be passed through…’, which research this statement is referring to?</td><td>Not by reference, but this is a step/procedure in this research.</td></tr>
<tr><td>5</td><td>Line 76 : what is ‘Van Der Waals Force? This require an explanation</td><td>The van der Waals force is founded on the recognition that spontaneous, transient electric polarization can arise at a center due to the motion of electrons, molecular distortion, or molecular orientation. This polarization will act on the surrounding region to perturb spontaneous fluctuations elsewhere (Ninham and Parsegian, 1970). (Line 80-83).

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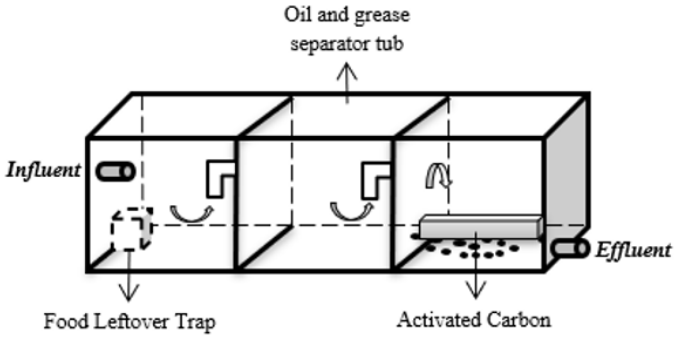
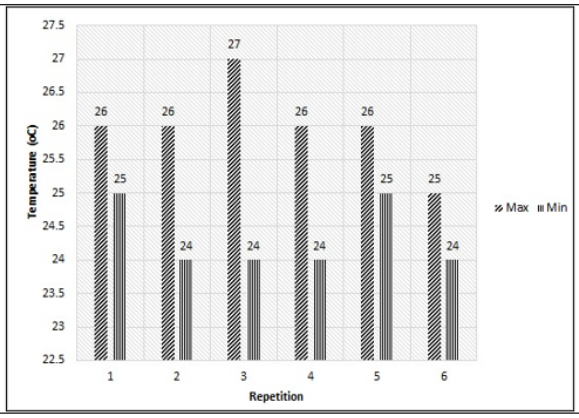
<tr><td>6</td><td>Line 79: ‘Based on this research..” which research?</td><td>Research conducted by the author.</td></tr>
<tr><td>7</td><td>Line 118 : Concentrate on your research instead of saying “this type of research”</td><td>Concentrate on research used True Experiment Pretest Posttest Without Control (Line 125-126)</td></tr>
<tr><td>8</td><td>Table 1: ‘1 inch, 2 inch,’ need to say if they are diameter or something else. Also, ‘1m’ should be in full (1 metre).</td><td>
<table>
<tr><th>Tools/Materials</th><th>Size</th><th>Quantity</th></tr>
<tr><td>Grease trap</td><td>90x30x40 (30x30x40 of each chamber)</td><td>1</td></tr>
<tr><td>Pipe</td><td>0.0254 m</td><td>1 m</td></tr>
<tr><td>Pipe</td><td>0.0508 m</td><td>1 m</td></tr>
<tr><td>T Pipe</td><td>0.0508 m</td><td>2</td></tr>
<tr><td>Grill Plat</td><td>-</td><td>0.5 m</td></tr>
<tr><td>Jerrycan</td><td>5 l</td><td>10</td></tr>
<tr><td>Activated Carbon</td><td>10 kg</td><td>-</td></tr>
<tr><td>Canteen Wastewater Sample</td><td>100 l</td><td>-</td></tr>
</table>
</td></tr>
</table>

9	Figure 1: the authors need to explain the figure in more details. It is important to say if this is their primary work. If it was used elsewhere, they need to say so with due acknowledgement to the source and reference. If this is built upon previous work, that should also be acknowledged and referenced.	 FIGURE 1. Modified grease trap (Zaharah et al, 2017)
10	Figure 2: Y-axis should be in percent point, not comma (e.g. 27.5, not 27,5 and soon), The axis title 'Temperature' should be accompanied with the corresponding unit (e.g. Celsius).	

11	Line 205: p-value in it self has no value without the corresponding point estimate and 95% confidence intervals.	Besides, the results of statistical tests, namely the post hoc test, have shown that activated carbon with a thickness of 30 cm obtained the greatest p-value 0.001) at 11.35 (95% CI = 8.65-14.04), which means that there is a very optimal difference in this variation (Line 203-205).
12	Line 242: it is unclear where this 5 mg/L came from. Is the results of the experiment?	Not from research, but based on standards and set by the Indonesian government (based on the Regulation of the Minister of Environment and Forestry Health No.68 of 2016 concerning Domestic Wastewater Quality Standards)
13	Conclusions point 1 to 3. Instead of repeating of the text three times with different results for different experiment phases, they could be better presented in a table with appropriate headings. Ideally, they should be presented in the "Results' section than in the 'Conclusion', where only a brief statement should do the job.	1. The reduction in oil and grease level that has occurred was at an average of 12.32 mg/L and the percentage of reduction in oil and grease levels of canteen wastewater with thickness variation of activated carbon at 10 cm was 49%, 20 cm was 62% (average:15.98 mg/L), and 30 cm was 89% (average: 23.67 mg/L). 2. Based on the result the most effective reduction of oil and greases levels using the modified grease trap in the canteen wastewater of PT. Sipatex Putri Lestari, was a variation thickness of activated carbon at 30 cm. Because it can reduce the oil and grease levels of the wastewater with a percentage of 89% and the result has met the quality standards which is maximum at 5 mg/L based on with the Republic of Indonesia Minister of Environment and Forestry Regulation No.68 of 2016.
14	All abbreviations and acronyms other than scientific one (e.g. pH) need to be spelled out in full for the first time use.	Has been revised
15	Use '.' Instead of comma for rate such as '10.40' instead of '10,40' (line 49). The reviewer name only for editorial office knowledge. The names of the reviewers assisting the editorial board will be listed in the last issue of each year and on the website.	.....grease from the wastewater of residual kitchen activities with a result of oil and grease as 10.40 mg/L (Line 52-53).

Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater

Key words: Canteen wastewater, Modified Grease Trap, Thickness, Activated Carbon, Oil, and Grease

Introduction

Wastewater is residual water from either or both industrial activities and non-industrial activities. Non-industrial wastewater such as domestic wastewater is derived from human daily life activities related to water use according to The Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 68 of 2016. Domestic wastewater (greywater) is wastewater originating from kitchen activities, toilets, sinks, and more, which will cause water pollution and impact on the aquatic life when directly discharged into the environment without any prior treatment.

The characteristics of domestic wastewater are generally grouped into physical, chemical, and biological characteristics. The physical characteristics of domestic wastewater include TSS (Suspended Residue), chemical characteristics include pH, ammonium, COD, and BOD, while organic chemistry includes oil and grease, and biological characteristics such as total coliform according to the above regulation.

Wastewaters with those parameters are prohibited from being discharged into water bodies if they do not meet the predetermined quality standards. Wastewater quality standards are a tolerable limit or level of pollution in the wastewater that will be disposed or released into the water bodies as a result of either or both industrial activities and non-industrial activities, according to the above regulation.

Currently, the most dominant pollutant in water bodies is Domestic Wastewater with a percentage that can reach up to 60-70%. Domestic wastewater consists of parameters such as BOD, TSS, pH, oil, and grease, when all these parameters are discharged directly into the water body it will cause water pollution (Faulconer and Mazyck, 2017).

Oil and grease are one source of contaminants that have not been handled properly in Indonesia (Abuzar et al., 2012). Oil and grease are one of the parameters with a number of maximum concentrations determined as a requirement for the discharge of industrial wastewater and surface water (Rahmi, 2016). High concentrations of oil and grease can damage aquatic ecosystems (Abuzar et al., 2012). Oil and grease contained in water bodies will form a layer on the surface because the density of oil is lower than the density of water. The layers of

oil and grease will block the entry of sunlight thus the aquatic plants could not process photosynthesis. For that, the wastewater should be treated first to meet the predetermined quality standards.

Based on the quality standards used for domestic wastewater, namely The Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 68 of 2016, concerning The Domestic Wastewater Quality Standards, the quality standard for organic chemical wastewater for oil and grease is 5 mg /L. This regulation is a regulation that must be applied by the wastewater producer, both industrial wastewater or domestic wastewater producer (Putu and Nieke, 2012).

PT. Sipatex Putri Lestari is a textile industry that facilitates a canteen in the company, the canteen operates every day from 11.00 to 13.00 Western Indonesian Time, as a result, PT. Sipatex Putri Lestari produces domestic wastewater as a residue of canteen kitchen activities. In February 2020 a laboratory test has been carried out to find out the concentration of oil and grease from the wastewater of residual kitchen activities with a result of oil and grease as 10.40 mg/L. The examination was carried out by the West Java Provincial Laboratory using the gravimetric method based on Indonesian National Standard (SNI) No. 06-6989-10-2004.

Based on the result. the concentration of oil and grease from the wastewater of residual kitchen activities at PT. Sipatex Putri Lestari does not meet the predetermined quality standards on The Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 68 of 2016, concerning Domestic Wastewater Quality Standards, the quality standard for organic chemical waste for oil and grease is 5 mg/L. Therefore, it's necessary to carry out a wastewater treatment before discharging it into the water body.

Rahmi in 2016 conducted research related to the reduction of oil and grease levels using various activated carbon, such as by using coconut shells, palm kernel shells, rice husks, and sawdust, with a thickness of 10 cm each. This activated carbon is used as an adsorption medium for domestic wastewater. The results of the research have stated that coconut shells and rice husks activated carbon was able to reduce oil and grease by 66.66%. Meanwhile, palm kernel shells activated carbon was only able to reduce oil and grease by 29.16% and sawdust activated carbon was very ineffective because it was unable to reduce oil and grease (Rahmi, 2016).

Zaharah et al (2017) have also conducted research in 2017 related to reducing oil and grease levels using activated carbon modified grease traps. The results of the research stated that there was a decrease in oil and grease level which was more effective compared to simple grease traps without modification of activated carbon. The oil and grease in the wastewater that has passed through the grease trap will be passed through the container containing activated carbon

and the output will be stored into a container. When passing through a 20 cm PVC pipe containing activated carbon, organic matter from oil and grease is reduced based on the principle of adsorption by activated carbon which can occur due to the pores that the adsorbent.

Activated carbon will be in contact with pollutants, where activated carbon will adsorb pollutant molecules until equilibrium conditions are reached. In this process, particles or molecules of pollutants will attach to the surface of activated carbon which happened due to the difference in the weak charge between the two, this occurs due to the van der Waals Force (Zaharah et al, 2017). The van der Waals force is founded on the recognition that spontaneous, transient electric polarization can arise at a center due to the motion of electrons, molecular distortion, or molecular orientation. This polarization will act on the surrounding region to perturb spontaneous fluctuations elsewhere (Ninham and Parsegian, 1970). According to Jaruwan et al (2014) modified oil traps have a higher efficiency of reducing TSS, BOD, oil, and grease than simple grease traps.

Based on this research, the researchers are interested in researching the differences in the thickness variation of activated carbon to reduce oil and grease levels using a modified grease trap on the canteen wastewater of PT. Sipatex Putri Lestari because the wastewater contains quite high levels of oil and grease. The modified grease trap is a grease trap reactor modified with activated carbon added to one of its parts, the purpose of modification or adding activated carbon is to increase the amount of reduction in oil and grease levels.

Rahmi (2016) conducted research using various variations of activated carbon with a thickness of 10 cm, the results of the study stated that it could reduce oil and grease levels by 66%. Zaharah et al in 2017 also conducted research using activated carbon, the thickness used was adjusted to the length of the PVC pipe used, which was 20 cm, the results showed the effectiveness in reducing oil and grease levels. Monik et al (2018) also used additional activated carbon in reducing oil and grease levels by using water jasmine (Echinodorus palaefolius) with a thickness of activated carbon of 5 cm, but the results showed that the reduction in oil and grease levels was ineffective and it has still exceeded the determined quality standard.

Based on this, the thickness variations that will be used by the researcher are 10 cm, 20 cm (that has been suggested by previous researchers) and 30 cm because Muhammad (2011) has stated that the thicker the media the better the results will be obtained s thus if the thickness is added to the arrangement of the media, it will be better in decreasing the oil and grease levels (Muhammad, 2011). Monik et al (2018) research stated that the lower the thickness of the activated carbon used, the less effective it is to reduce the existing oil and grease levels. As a result, the oil and grease levels produced are below the quality standard values that have been

determined in The Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 68 of 2016, concerning Domestic Wastewater Quality Standards.

The type of activated carbon that will be used in this research is activated carbon from coconut shells. According to Rahmi (2016) the effective activated carbon in reducing the oil and grease is by using the coconut shell charcoal and rice husk charcoal. Daniel et al (2013) stated that the use of basic material from coconut shells is not only used because of the affordable price and it's easy to obtain, but also because of the properties and characteristics of the content in the coconut shells both chemically and physically, coconut shells have a high carbon content thus they have the potential to become an alternative renewable energy source. A good coconut shell for activated carbon is an old and dry shell because its carbon content is higher than that of younger ones.

The utilization choice of activated carbon made from coconut shells is because coconut shells activated carbon has a wide surface, lightweight, and it has many pores thus it supports the attaching process of pollutants in the wastewater (Eka et al, 2013).

Material and methods

The type of research used is experimental research which aims to determine the difference in the thickness variations of activated carbon to reduce oil and grease levels using a modified grease trap on the canteen wastewater of PT. Sipatex Putri Lestari. Concentrate on research used True Experiment Pretest Posttest Without Control. The modified grease trap is a grease trap reactor with activated carbon added to one of its parts, the purpose of modification of activated carbon added is to increase the amount of reduction in oil and grease levels.

Work Procedures

The following preparation of tools and materials used for research are:

TABLE 1. Preparation of tools and materials used for research

Tools/Materials	Size	Quantity
Grease trap	90x30x40 (30x30x40 of each chamber)	1
Pipe	0.0254 m	1 m
Pipe	0.0508 m	1 m
T Pipe	0.0508 m	2
Grill Plat	-	0.5 m
Jerrycan	5 l	10
Activated Carbon	10 kg	-
Canteen Wastewater Sample	100 l	-

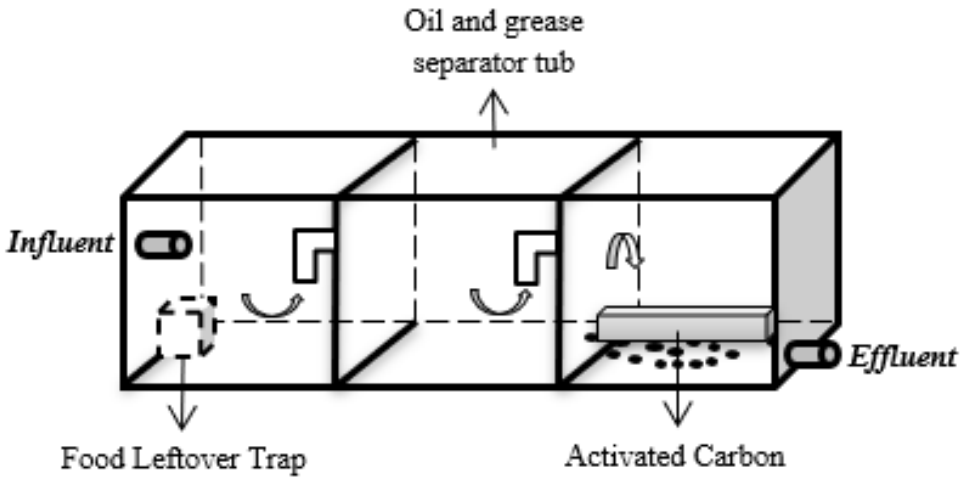


FIGURE 1. Modified grease trap (Zaharah et al, 2017)

The wastewater is passed through the modified grease trap with a thickness variation of activated carbon as 10 cm, 20 cm, and 30 cm.

Data Processing

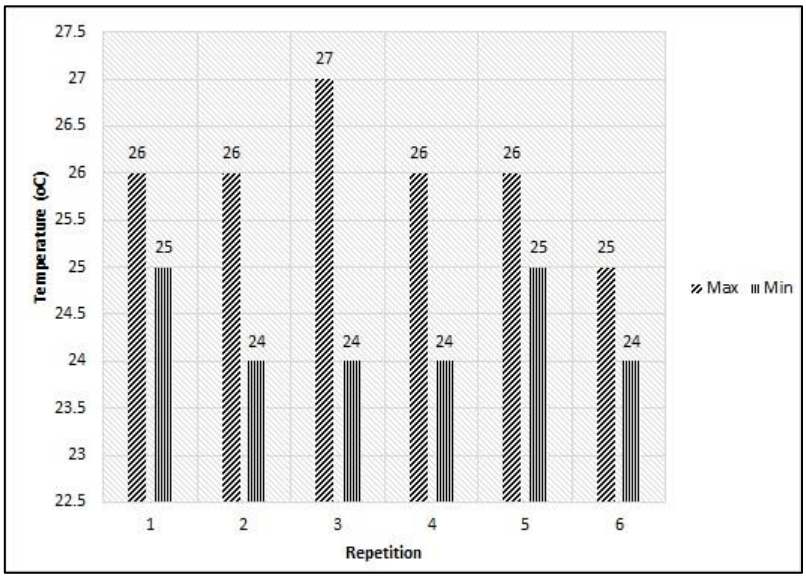
The data processing stage is carried out by doing the editing process, such as rechecking the measurement results of the data, the coding process which is coding the measurement data, the data entry process which is entering the measurement results of the data into the data analysis software called SPSS for further analysis and the cleaning process which is the re-checking process of the measured data that has been entered to see any possibility of coding errors and incomplete measurement data for further correction process.

The data analysis used in this research is the univariate analysis and bivariate analysis. In this study, univariate analysis was used to determine the normality of the data using the Shapiro-Wilk test, the mean, minimum and maximum values and standard deviation values of the decreasing levels results in the measurements of oil and grease levels while the bivariate analysis was carried out using the one-way ANOVA test because the data results from the measurement of decreasing oil and grease levels is in the normal distribution.

Results and discussion

1. Temperature Test Result

FIGURE 2. The temperature of canteen wastewater in PT. Sipatex Puti Lestari



The results obtained in measuring the temperature of the canteen wastewater before and after the treatment was ranging from 24ºC – 27ºC. The higher the temperature, the lower the viscosity, and density which will cause the liquid to flow quickly. The viscosity of a liquid will cause a certain amount of friction between parts or layers of fluid that move one against another. The friction or resistance that occurs is due to the cohesion force in the liquid, thus the viscosity of a liquid is due to the cohesion force between particles or molecules of the liquid. The change in temperature of the reaction causes the motion of the molecules to accelerate (collisions between reactant molecules increases) (Wahyuni, 2015).

The reduction in oil and grease level is affected by the room temperature that will transform grease into a solid form and oil into a liquid form (Julianto, 2013). When this situation occurs it will make the adsorption process carried out by activated carbon easier. The temperature measured in this study corresponds to room temperature, which is in the range of 24ºC-27ºC.

2. pH Test Result

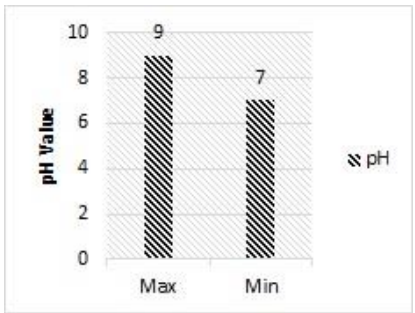


FIGURE 3. pH test result

The pH of wastewater from PT. Sipatex Putri Lestari ranges at 7 - 8.5, thus it can be concluded that the pH of the canteen wastewater tends to be alkaline due to the process of dish-washing using soap. pH is one of the factors that affect the rate and ability of adsorption. At pH conditions greater than or equal to 7, the efficiency of reducing oil and grease concentration increases. (Valencia, 2017). The pH of the wastewater is measured from PT. Sipatex Putri Lestari ranges from 7-8.5 with that result that the adsorption process to reduce oil and grease levels runs optimally.

3. Measurement Result of Oil and Grease Levels of the Wastewater

The oil and grease levels of the canteen wastewater before given treatment was at an average result of 27.4 mg/L, and after being treated with a thickness variation of activated carbon using a modified grease trap, the oil and grease levels of activated carbon with a thickness of 10 cm was at an average of 15 mg/L, activated carbon with a thickness of 20 cm was at an average of 11.5 mg/L, and activated carbon with a thickness of 30 cm was at 3.7 mg/L.

TABLE 3. Measurement result of oil and grease level on each activated carbon thickness

Repitition	Measurement Result of Oil and Grease Level on each Activated Carbon Thickness					
	10 cm Activated Carbon Thickness		20 cm Activated Carbon Thickness		30 cm Activated Carbon Thickness	
	Pre (mg/L)	Post (mg/L)	Pre (mg/L)	Post (mg/L)	Pre (mg/L)	Post (mg/L)
1	31.8	18.8	31.5	12.7	31.7	4.2
2	23.1	13.2	23.4	11.6	23.8	2.2
3	26.6	13.8	26.8	10.8	26.7	3.1
4	25.5	12.9	25.7	9.7	25.8	2.8
5	29.3	17.3	29.5	11.9	28.8	4
6	27.8	14.2	27.9	12.2	27.3	3.5
Average	27.4	15.0	27.5	11.5	27.4	3.7
Max	31.8	18.8	31.5	12.7	31.7	4.5
Min	23.1	12.9	23.4	9.7	23.8	2.2
SD	3.03	2.43	2.85	1.08	2.70	0.66

3.1 Percentage of Reduction in Oil and Grease Level

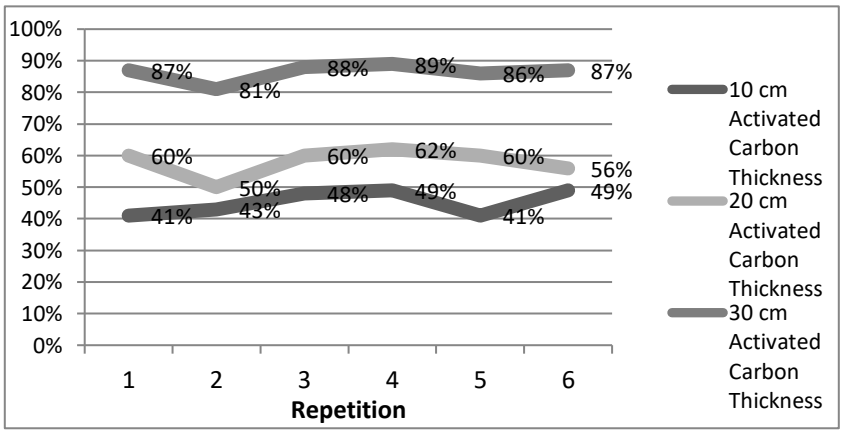


FIGURE 4. Percentage of reduction in oil and grease level

The average result of the reduction in oil and grease levels with a thickness variation of 10 cm was at 12.32 mg/L with a percentage of 49%, an average reduction in oil and grease levels with a thickness variation of 20 cm was at 15.98 mg/L with a percentage of 62% and an average reduction in oil and grease levels of 13 cm thickness was at 23.67 mg/L. The highest percentage reduction in oil and grease levels occurred in the third treatment variation, which was the thickness variation of activated carbon at 30 cm with an average result of 86% in the reduction of oil and grease levels.

Besides, the results of statistical tests, namely the post hoc test, have shown that activated carbon with a thickness of 30 cm obtained the greatest p-value 0.001) at 11.35 (95% CI = 8.65-14.04), which means that there is a very optimal difference in this variation. The reduction that occurs after the treatment with the thickness variation of activated carbon using a modified grease trap happened due to the sedimentation process where oil and grease particles will rise to the surface and then followed by the adsorption process where activated carbon will be in contact with the pollutants, activated carbon will adsorb pollutant molecules until equilibrium conditions are reached. The reduction in oil and grease levels of PT. Sipatex Putri Lestari occurs because of the physical processing, namely the sedimentation and adsorption process with activated carbon adsorbents using a modified grease trap. Sedimentation is a deposition process in which these oils and grease will float to the surface of the water because the oil density is lower than the water density. Adsorption is either or both physical and chemical processes in which the substance accumulates on a surface layer of the absorbent substance.

In this process, particles or molecules of pollutants will attach to the surface of the activated carbon which is caused by the difference of the weak charge between the two, this occurs due to the van der Waals force (Zaharah et al, 2017).

Activated carbon is a carbon-based material that has a broad surface and internal porous structure with a pore distribution that varies in size, and a broad spectrum of oxygenated functional groups (Faulconer and Mazyck, 2017; Valencia, 2017; Eka et al., 2013). The type of activated carbon used in this study is coconut shell-based activated carbon. Because coconut shells are very easy to obtain and they are one of the abundant renewable resources, one of the efforts made to utilize them is by processing coconut shells into activated carbon. This activated carbon material is widely used in industry, especially in the field of oil, water treatment, gas, food, beverage, medicine, and chemical industry (Rizky, 2017). According to Rahmi (2016), the effective type of activated carbon used in the filtration in reducing the value of oil and grease is coconut shell charcoal and rice husk charcoal.

The particle size of activated carbon used in this study was 8-16 mesh, the type of activated carbon used was coconut shell. In the research of Putu and Nieke (2012), activated carbon with a diameter of 1.19 mm (16 mesh) had the best removal efficiency to reduce oil levels. The smaller the media diameter, the greater the effective surface area, which will increase the ability to absorb organic pollutants. The thicker the activated carbon used, the more activated carbon particles will absorb the levels of oil and grease in the canteen wastewater of PT. Sipatex Putri Lestari, this also affects the increase of contact time of pollutants with activated carbon particles. Therefore, the thickness of activated carbon affects the reduction in oil and grease levels of PT. Sipatex Putri Lestari. The reduction that occurred in the 30 cm thickness variation of activated carbon reached the most optimal and effective point in reducing oil and grease levels of the canteen wastewater at PT. Sipatex Putri Lestari has finally met the requirements whereas the result was following the quality standard because it does not exceed the maximum of 5 mg/L based on the Regulation of the Minister of Environment and Forestry Health No.68 of 2016 concerning Domestic Wastewater Quality Standards.

The flow rate used in the research was 2.22 L/minute which is adjusted to the existing flow rate conditions in the industry so that the condition or characteristics of the flowing water will be similar to as it was in the industry.

Conclusions

1. The reduction in oil and grease level that has occurred was at an average of 12.32 mg/L and the percentage of reduction in oil and grease levels of canteen wastewater with thickness variation of activated carbon at 10 cm was 49%, 20 cm was 62% (average:15.98 mg/L), and 30 cm was 89% (average: 23.67 mg/L).
2. Based on the result the most effective reduction of oil and greases levels using the modified grease trap in the canteen wastewater of PT. Sipatex Putri Lestari, was a variation thickness of activated carbon at 30 cm. Because it can reduce the oil and grease levels of the wastewater with a percentage of 89% and the result has met the quality standards which is maximum at 5 mg/L based on with the Republic of Indonesia Minister of Environment and Forestry Regulation No.68 of 2016.

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Summary

Differences in Thickness Variations of Activated Carbon in Decreasing Oil and Grease Levels Using Modified Grease Trap on The Canteen Wastewater at PT. Sipatex Putri Lestari. Wastewater is residual water of industrial activities and domestic wastewater that is derived from daily activities of human life related to water usage, such wastewater should not be discharged into water bodies if it has not met the standards based on the regulation. Oil and grease contained in the water bodies will form a layer on the surface because the density of oil is lower than the density of water. The layer of oil and grease will block the entry of sunlight and cause the inability in the photosynthesis process of aquatic plants. The textile industry facilitates canteens within the company which operates daily from 11.00 to 13.00 West Java Time, resulting in the domestic wastewater from the canteen kitchen activities. The purpose of this study was to determine differences in the thickness variations of activated carbon to reduce oil and grease levels using modified grease traps on the canteen wastewater at PT. Sipatex Putri Lestari. The type of study used was categorized as a field experiment with a pretest-posttest research design. The population of the study was the entire canteen wastewater of PT. Sipatex Putri Lestari. The sampling technique used the time composite method. The univariate analysis of the study showed the average number of decreases in oil and grease levels in the treatment

as 1) 12.32 mg / L, 2) 15.98 mg / L, and 3) 23.67 mg / L. The bivariate data analysis used the one-way ANOVA test. The results of the experiment on the three thickness variations of activated carbon within 6 times repetitions resulted in a decrease of oil and grease levels, which is 49% at 10 cm, 62% at 20 cm, and 88% at 30 cm. The conclusion of the study showed differences in the thickness variations of activated carbon to reduce oil and grease levels using a modified grease trap on the canteen wastewater at PT. Sipatex Putri Lestari. Furthur Suggestions for this study are to determine the saturation period of activated carbon and periodic maintenance of the tool.

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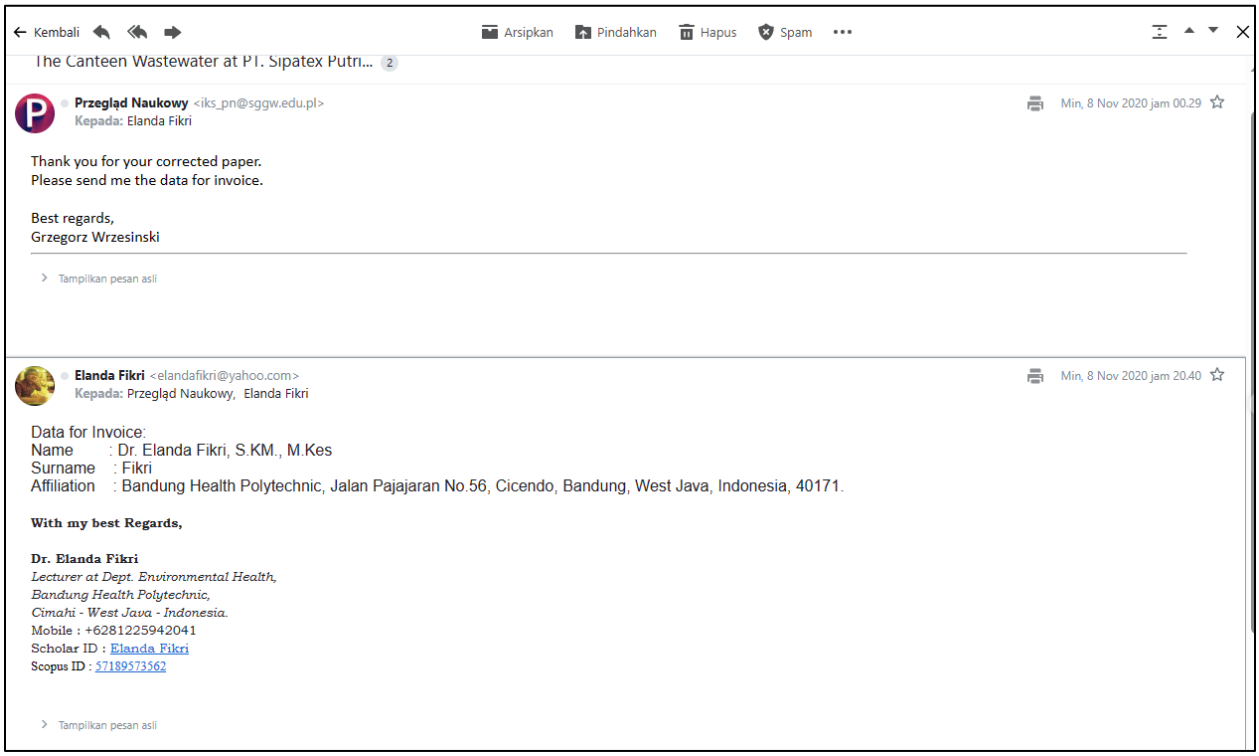

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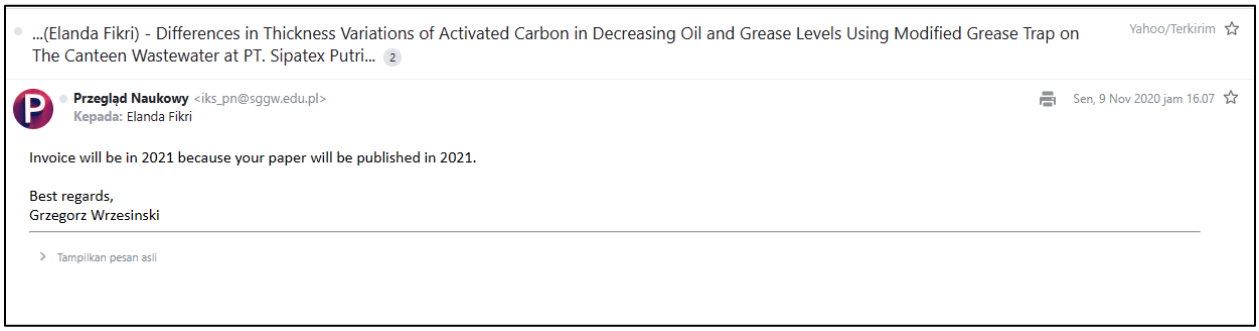

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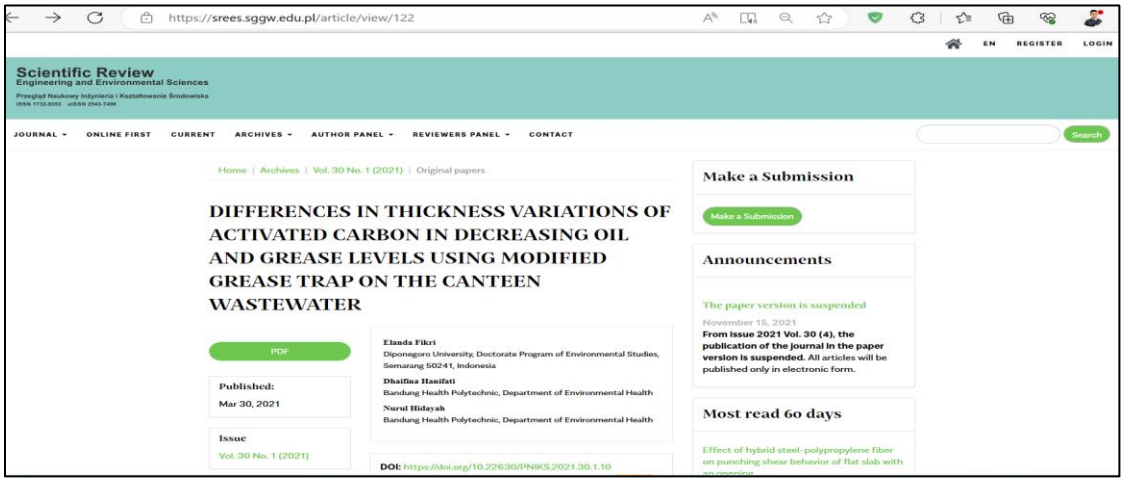

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DIFFERENCES IN THICKNESS VARIATIONS OF ACTIVATED CARBON IN DECREASING OIL AND GREASE LEVELS USING MODIFIED GREASE TRAP ON THE CANTEEN WASTEWATER

PDF

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