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Sun, Mar 22, 2020 at 11:24

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Title: THE UTILIZATION OF WASTE CAPIZ SHELL (Amusium Pleuronectes) - BASED CATALYST FOR THE CONVERSION OF LEATHER TANNING WASTE INTO BIODIESEL: ZERO-WASTE APPROACH AND ITS SIMPLE VIABILITY STUDY Journal of Environmental Chemical Engineering Research Paper

Dear Dr. Maria Yuliana,

We have received your article "THE UTILIZATION OF WASTE CAPIZ SHELL (Amusium Pleuronectes) - BASED CATALYST FOR THE CONVERSION OF LEATHER TANNING WASTE INTO BIODIESEL: ZERO-WASTE APPROACH AND ITS SIMPLE VIABILITY STUDY" for consideration for publication in Journal of Environmental Chemical Engineering.

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JECE-D-20-00671: Decision

1 message

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Mon, Mar 23, 2020 at 5:51

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Manuscript No.: JECE-D-20-00671

Title: THE UTILIZATION OF WASTE CAPIZ SHELL (Amusium Pleuronectes) - BASED CATALYST FOR THE CONVERSION OF LEATHER TANNING WASTE INTO BIODIESEL: ZERO-WASTE APPROACH AND ITS SIMPLE

VIABILITY STUDY

Article Type: Research Paper

Corresponding Author: Dr. Maria Yuliana

All Authors: Maria Yuliana, Ph.D.; Shella P Santoso, Ph.D.; Felycia E Soetaredjo, Ph.D.; Suryadi Ismadji, Ph.D.; Artik E Angkawijaya, Ph.D.; Wenny Irawaty, Ph.D.; Yi-Hsu Ju, Ph.D.; Phuong Lan Tran-Nguyen, Ph.D.; Sandy B Hartono, Ph.D.

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Yours sincerely,

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Title: THE UTILIZATION OF WASTE CAPIZ SHELL (Amusium Pleuronectes) - BASED CATALYST FOR THE CONVERSION OF LEATHER TANNING WASTE INTO BIODIESEL: ZERO-WASTE APPROACH AND ITS SIMPLE VIABILITY STUDY

Journal of Environmental Chemical Engineering

Research Paper

Dear Dr. Maria Yuliana,

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Title: THE UTILIZATION OF WASTE CAPIZ SHELL (Amusium Pleuronectes) - BASED CATALYST FOR THE CONVERSION OF LEATHER TANNING WASTE INTO BIODIESEL: ZERO-WASTE APPROACH AND ITS SIMPLE VIABILITY STUDY

Journal of Environmental Chemical Engineering

Dear Dr. Yuliana,

Thank you for submitting the above paper to Journal of Environmental Chemical Engineering. Your manuscript needs major revisions.

The reviewers comments are included below for your attention. Please carefully address the issues raised in the comments. I invite you to submit your revised manuscript.

The due date for submitting your revised manuscript is May 13, 2020

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AND

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Reviewers' comments:

Reviewer #1: The paper "The Utilization of Waste Capiz Shell (Amusium Pleuronectes) - Based Catalyst for the Conversion of Leather Tanning Waste Into Biodiesel: Zero-waste Approch and Its Simple Viability Study" investigate the FAEE production from tannery residue and catalyzed by heterogeneous alkaline compound obtained from capiz shell. The manuscript is well written, structured, the proposal of the research is interesting and addresses an important topic. However, in order to allow the publication of the work, some major issues must be revised, especially in relation to the cost analysis presented by the authors:

- In my opinion, the title is a little long. Suggestion of a more concise and informative title: "UTILIZATION OF WASTE CAPIZ SHELL - BASED CATALYST FOR CONVERSION OF LEATHER TANNING WASTE INTO BIODIESEL";
- 2. The authors must highlight in the Introduction Section what is the novelty of the research in relation to what has already been published about the subject. The synthesis of acyl esters (biodiesel) from waste material using heterogeneous alkaline catalysis is a well-established topic. No approach in this regard has been made;
- 3. Why did the authors choose to work with ethanol? Although it is a "greener" acyl acceptor, the results could be more promising if methanol had been used, once its higher reactivity would reduce considerably the reaction time required to achieve a favorable biodiesel yield. Methanol also has lower costs of production, which would bring more economic advantages to their process.
- 4. Page 3, line 31. In the second paragraph of the Introduction, the issue "biodiesel" is inserted in the manuscript very abruptly. Firstly, there should be a contextualization the theme to thereby to mention the problems in relation to the costs of the raw material used by the industries;
- 5. Page 4, line 20. "Calcium oxide (CaO) is one of the promising heterogeneous catalysts in biodiesel production". The use of CaO in the synthesis of biodiesel is not something "promising" since for several years the use of this compound has been addressed in researches on the subject. Please, rewrite this sentence.
- 6. There are many statements and data mentioned in the manuscript without reference. Please, review this.
- 7. Specify and standardize throughout the text the metric unit for mass concentration, especially for the parameter "catalyst concentration". I assume that the maximum yield obtained by the authors was for a catalyst concentration of 3 wt% although in the text only "3%" was used;

- 8. Page 7, line 27 to 39. How was defined the range of variation of the investigated parameters (reaction time, catalyst load and the two EtOH to LTW molar ratios)? Have preliminary tests been performed or chosen according to values usually adopted in similar researches? Please, clarify this in the manuscript;
- 9. Page 7, line 29. Why did the authors choose to investigate only two EtOH to LTW molar ratios? The excess of alcohol used in the process is a much more important parameter than the reaction time, where obviously an increase in the reaction time leads to an increase in the biodiesel yield. It would be more interesting to use at least four EtOH:LTW molar ratios (6:1; 8:1, 10:1, 12:1, for example) and define a fixed reaction time for all tests (4 h, for example).
- 10. Page 8, Equation 1 and 2. I am not convinced that the form the authors calculated the biodiesel yield obtained in the tests is coherent. Usually, the FAEE (or FAME) yield for a biodiesel synthesis reaction is calculated using only equation 1, which the authors named "FAEE purity". Equation 2 seems to me to be more a calculation of losses in the process, since by chromatography, the authors demonstrated that 97.8% of the sample is FAEE. Please, explain this methodology adopted.
- 11. The discussion of the results is well written. However, the presentation of results could be improved. Figure 2 is a fundamental part of the discussion and, in my opinion, the way it is presented restricts the results interpretation. The presentation of these graphs (Figure 2a and b) in the usual way (in two dimensions instead of three) seems to me to be a better option.
- 12. Page 14, line 10. "[...] resulting in the generation of calcium-carboxylate, a component that is miscible in the lipid phase and induces the formation of methanol-oil emulsion". Was not used in the tests ethanol? Please, review this sentence.
- 13. Page 14, Table 3. A comment regarding the FAEE cloud point obtained by the authors should be mentioned, since the value presented of 10.1 °C is considerably high. In countries with severe winter, this can be a problem, and a suggestion to overcome this inconvenience could be presented by the authors in order to enrich the discussion of the results. Many alternatives from different companies are currently offered to correct this problem.
- 14. Page 14, Table 3. The authors used a residue with high acidity (14.2 wt%) as raw material for the process. However, no comments regarding the final acid value for the synthesized FAEE was made. Usually, regulatory standards impose a maximum acid value of 0.5 mg KOH/g. As it is an easy analysis to be performed, I suggest that the authors add to Table 3 the acid value of the biodiesel produced in the tests.
- 15. The costs evaluation of the process, while being simple, presents an interesting discussion for the manuscript. However, some points observed by me show divergences that must be considered in order to allow the publication of this analysis in the manuscript. Points to be reviewed:
- The authors did not consider for Process A the costs for feedstock purification: washing, water evaporation and filtration of impurities;
- For process A, the reuse of the catalyst for successive cycles was considered. However, after two batches, according presented in Figure 3, data for FAEE yield tend to be below what regulatory standards require to the esters concentration (usually > 97 %);
- From my own experience, I say that the homogeneous alkaline process widely used in industries around the world usually employs 0.5 wt% of sodium methylate (the authors considered 1.67 wt%);
- For process B, it was considered a refined raw material to be converted into biodiesel. However, biodiesel industries use degummed raw materials ("less pure" than refined ones) in the process, often blended with other fatty materials, reducing production costs. Therefore, I believe that the value of the costs related to the raw material of process B are
- The authors accomplished the economic analysis considering ethanol as process reagent. However, biodiesel industries (Process B) use methanol as reagent, which has a much lower production cost than ethanol; As the results and discussion are presented, it is difficult to believe that the heterogeneous process has a total production cost of only 1.65 % in relation to the homogeneous one.

Additional suggestions are	found in the	attached file	"JECE-D-20-00671R1"
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Title: UTILIZATION OF WASTE CAPIZ SHELL - BASED CATALYST FOR THE CONVERSION OF LEATHER TANNING WASTE INTO BIODIESEL

Journal of Environmental Chemical Engineering

Dear Dr. Yuliana,

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Best regards,	

Maria Yuliana, S.T., Ph.D. **Chemical Engineering Department** Faculty of Engineering Widya Mandala Catholic University Surabaya Jalan Kalijudan 37, Surabaya 60114, Indonesia Tel. 62 31 3891264 ext 112 Fax. 62 31 3891267

E-mail. mariavuliana@ukwms.ac.id

mail: manayanana@akwmo.ao.ia	

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