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REVIEWER'S REPORT

Manuscript No.: **IJAR-53019**

Title: Effects of calcination temperature on the catalytic activity of CaO synthesized by alkaline precipitation in the transesterification reaction

Recommendation:
Accept as it is ……………………………….
Accept after minor revision……………..
Accept after major revision ……………..
Do not accept (*Reasons below*) ………

Rating	Excel.	Good	Fair	Poor
Originality			✓	
Techn. Quality			✓	
Clarity		✓		
Significance		✓		

Reviewer Name: Mir Tanveer

Reviewer's Comment for Publication.

Abstract and Scope:
The abstract clearly outlines the motivation, objective, methodology, and key findings of the study. The relevance of developing alternative fuels such as biodiesel is effectively contextualized within broader environmental and energy concerns. The focus on synthesizing CaO catalysts via alkaline precipitation and evaluating their catalytic activity at different calcination temperatures is well-defined. The data indicating yields between 65–91% and optimal performance at 850 °C provides a strong scientific basis for the study's conclusions.

Scientific Relevance:
The manuscript addresses a significant issue in renewable energy research: optimizing catalysts for biodiesel production. The use of CaO, a low-cost and effective heterogeneous catalyst, aligns with ongoing efforts to make biodiesel production more economically viable. The discussion of calcination temperatures contributes to the understanding of how thermal treatment affects catalytic performance and reusability.

Experimental Design and Methodology:
The experimental approach involving the synthesis of CaO from calcium chloride via alkaline precipitation, followed by calcination at varied temperatures (750, 850, and 950 °C), is appropriate and scientifically sound. Testing each sample across three reaction cycles provides data on catalyst stability

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and reusability. Measurement of methyl ester yields and kinematic viscosity at 40 °C adds depth to the catalytic performance evaluation.

Results and Discussion:
The results are clearly presented and support the conclusion that calcination temperature significantly influences the catalytic behavior of CaO. The consistent catalytic activity across samples and superior reusability of the 850 °C catalyst are highlighted as key outcomes. The discussion relating catalytic activity to leaching and CaO dissolution shows an informed understanding of catalyst deactivation mechanisms.

Literature Integration and Theoretical Grounding:
The introduction provides a comprehensive background on climate change, renewable energy alternatives, and the role of biodiesel. It appropriately cites key references and positions the study within the broader academic discourse. The inclusion of both environmental and technical perspectives enhances the manuscript's depth and appeal to a multidisciplinary audience.

Language and Structure:
The language is formal, technical, and consistent with academic writing standards in the fields of chemical engineering and renewable energy. The structure—from abstract to introduction and methodology—is logical and supports reader comprehension.

Keywords:
The selected keywords—methyl ester, heterogeneous catalysis, ceramic powder, vegetable oil—are relevant and reflective of the manuscript's core focus areas.

Conclusion:
This manuscript offers a well-structured, scientifically valid, and timely exploration of CaO catalysts for biodiesel synthesis. It provides valuable insights into the role of calcination temperature in optimizing catalytic activity and operational stability, contributing meaningfully to the field of sustainable energy.