ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

Manuscript No.: IJAR- 57906

Title: Synthesis and characterization of zeolitic catalysts by the Plackett and Burman (PB) plan method using local materials from Niger

Recommendation:
Accept

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

Reviewer Name: Dr. Ashish Yadav

Detailed Reviewer's Report

Reviewer's Comment for Publication.
Acceptance Comment are mentioned below suitable for the paper titled "Synthesis and characterization of zeolitic catalysts by the Plackett and Burman (PB) plan method using local materials from Niger"

Reviewer Comments: Accept

Reviewer Comments –

Introduction
The introduction effectively establishes the importance of zeolitic catalysts in petroleum refining and catalytic cracking processes. The authors clearly explain the motivation for utilizing locally available materials from Niger as cost-effective alternatives to conventional catalyst precursors. The significance of catalyst acidity, structure, and yield enhancement is appropriately highlighted. The research objectives are well defined and aligned with current trends in sustainable material development. The introduction provides a solid foundation for the study, although the inclusion of a few recent references on green catalyst synthesis could further strengthen this section.

Literature Review
The literature review adequately discusses previous studies related to zeolite synthesis, catalyst characterization, and catalytic cracking applications. The authors successfully identify existing challenges in catalyst production and emphasize the importance of optimizing synthesis parameters. The discussion of clay-based and silica-rich precursor materials provides relevant context for the present study. The review demonstrates a good understanding of catalyst chemistry and process optimization techniques. Additional discussion of recent advances in experimental design methodologies for catalyst development would further enhance the comprehensiveness of the review.

Solution Approach / Methodology

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The methodological framework is systematic and scientifically sound. The use of locally sourced clays and sand, combined with chemical reagents, provides a sustainable approach to catalyst synthesis. The application of the Plackett–Burman design based on the Hadamard matrix is particularly appropriate for identifying significant process variables. Comprehensive characterization techniques, including XRD, XRF, FTIR, BET, SEM, and thermal analyses, ensure thorough evaluation of both raw materials and synthesized catalysts. The methodology is clearly described and can be replicated by other researchers.

Results and Discussion

The results are presented clearly and demonstrate the effectiveness of the proposed synthesis strategy. The identification of aluminum is opropoxide, clay content, stirring time, drying time, and calcination temperature as influential factors is well supported by experimental evidence. The acidity measurements obtained through the Boehm test provide a meaningful indicator of catalytic performance. The characterization results confirm that the synthesized catalysts possess structural and physicochemical properties comparable to zeolite Y and intermediate zeolite Y. The superior performance of catalyst CAZ-2, reflected by an 83% catalytic yield and increased production of light molecules, highlights the practical significance of the research findings.

Conclusion

The conclusion effectively summarizes the key contributions and outcomes of the study. The research successfully demonstrates the feasibility of producing high-quality zeolitic catalysts from locally available materials in Niger. The optimized catalysts exhibit desirable structural, chemical, and catalytic properties suitable for petroleum refining applications. The integration of statistical experimental design with advanced characterization techniques strengthens the reliability of the findings. The work offers valuable economic and environmental benefits through the utilization of indigenous resources. Overall, the manuscript makes a meaningful contribution to catalyst engineering and is suitable for publication.