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**COLLEGE OF ENGINEERING
CENTRAL PHILIPPINE UNIVERSITY
Jaro, Iloilo City, Philippines
Tel No: 63 (33) 3291971 loc 1084**



**THERMO-CATALYTIC PYROLYSIS OF RESIDUAL PLASTIC WASTE TO PRODUCE
PYROLYSIS OIL USING BENCH-SCALE BATCH REACTOR UTILIZING EGGSHELLS
AND BENTONITE CLAY AS CATALYSTS**

A Research Paper

By

MAINIT, Elijah John
SARMIENTO, Ron Paolo
TRAVIÑA, Sydney Anne

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Adviser

Dr. Dahlia H. Pescos

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Mainit, Elijah John D.; Sarmiento, Ron Paolo C.; Traviña, Sydney Anne T.

ABSTRACT

This research study addresses the environmental impact of plastic waste in Iloilo City and proposes the adoption of thermo-catalytic pyrolysis as a potential solution. The city faces pressing challenges due to the large volume of non-biodegradable plastic waste, leading to recurring floods and pollution. To address this issue, the researchers designed and constructed a bench-scale batch reactor using eggshells and bentonite clay as catalysts to convert LDPE plastics into pyrolytic oil. The necessary materials, including LDPE plastics and eggshells, were collected, and bentonite clay was purchased online. Thorough preparation of the feedstock and catalysts was performed, involving washing, drying, sizing the plastics, and grinding the eggshells. The thermo-catalytic pyrolysis experiments were carried out in an inert atmosphere using nitrogen gas, at specific heating rates and reaction times under atmospheric pressure. The resulting pyrolytic oil was analyzed for weight percent yield and fuel properties, compared with pyrolytic oil produced without catalysts and standard commercial-grade fuels. The findings showed that the presence of catalysts significantly increased the production of pyrolysis oil, improving its fuel properties and making it comparable to gasoline and diesel. In conclusion, the study emphasizes the potential of thermo-catalytic pyrolysis as a sustainable solution for plastic waste management, contributing to waste reduction and renewable energy generation. It offers valuable insights into the use of eggshells and bentonite clay as effective catalysts and sets the groundwork for further

research in this field. By implementing this technology, Iloilo City can work towards a cleaner environment and more sustainable waste management practices.