

UGM Students Observe Country Almond Waste to Turn LDPE Plastic Waste into Fuel

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Three UGM students have researched the use of country almond (*Terminalia catappa*) waste into activated carbon for cobalt-molybdenum bimetallic catalyst in plastic waste hydrocracking process.

Dewi Agustinarsih, Satriyo Dibyo Sumbogo, and Nawwal Hikmah, supervised by chemistry lecturer, Mokhammad Fajar Pradipta, S.Si., M.Eng., did the research for Student Creativity Programme Year 2019 of Research, Technology, and Higher Education Ministry.

The research was done to give solution to the problem of high level of plastic waste. Besides, there is already a ban in place in several areas against the use of plastic bag. "The plastic bag ban is a preventive measure, but it takes a long time to minimise the amount of the waste. The repressive measure is to process the plastic waste into useful material," said Dewi.

They converted the plastic waste of Low Density Polyethylene (LDPE) into petrol fraction by utilising country almond waste. She explained the country almond waste has high content of lignocellulose with high lignin content or 43.46%. This makes the country almond shell potential as a good source of active carbon in hydrocracking process.

He explained bimetallic cobalt-molybdenum was used because CoMo had been proven to have better selectivity than Ni, NiMo, and Co catalysts to produce petrol fractions in LDPE plastic hydrocracking. The students also examined the contribution of each condition of reaction - temperature, flow rate of H₂ gas, and weight hourly space velocity (WHSV) in petrol product yields.



This research is useful for reducing plastic waste amount as well as meeting the country's increasing need of fuels.

According to United States Energy Information Administration (USEIA), the need of fuel will continue to increase up to 123 million barrels per day (mmbpd) in 2025, while Organization of Petroleum Exporting Countries (OPEC) predict the production will only reach 61 mmbpd in 2025.

Hence, finding is needed regarding alternative renewable fuel, including by converting plastic into petrol fraction by using catalysts.

The result of the research is expected to be able to reduce the amount of LDPE waste that can reduce environment quality, meeting increasing need of fuel, and finding alternative to bimetallic system of non-precious metal in activated carbon of country almond shell that has catalytic activity nearing that of precious metals.

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