Scientists propose the optimal way to produce biofuels

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Scientists from Russia, China, Saudi Arabia, the UAE, and Egypt have proposed the most effective mathematical model of the biodiesel production process at the moment. The simulation of the biodiesel

production process from soybean oil and methanol was performed using machine learning. The study was published in *Environmental Technology & Innovation*.

Afrasyab Khan, Senior Researcher at the SUSU Vibration Testing and Structural Condition Monitoring Center, participated in the study as part of an international team of scientists. Biodiesel is a renewable diesel fuel produced from natural raw materials. Since the cost of biodiesel production is a significant problem for commercialization, scientists have used machine learning to model and optimize the biodiesel production process.

"The main uniqueness of our research lies in the development of a hybrid calculation method to optimize the simulation of a chemical reaction in the synthesis of biofuels. We have determined in what percentage it is necessary to mix soybean oil and methanol, how much catalyst to add for a chemical reaction so that it runs most efficiently. The result represent a mathematical model that helped determine the best temperature and composition of the starting material for the production of the maximum amount of biofuels and minimizing waste. Like so, we offer the production of a more environmentally amiable type of fuel and increase the efficiency of the production process," says Afrasyab Khan.

Biofuels have recently become more popular around the world due to their benefits to the environment and the reduction of fossil fuel resources, which can have an adverse impact on the environment. Various renewable resources, including vegetable oils and animal fats, can be used as the essential materials for the production of biofuels through catalytic processes. The methodology developed in the study can be useful for increasing the production capacity of biofuels, which allows you to use less energy and pollute the environment less.

More information: Xuejin Sun et al, Modeling and optimization of vegetable oil biodiesel production with heterogeneous nano catalytic process: Multi-layer perceptron, decision regression tree, and K-Nearest Neighbor methods, *Environmental Technology & Innovation* (2022). DOI: 10.1016/j.eti.2022.102794

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