Optimizing the Production of Biodiesel from Marine Algae Using Novel Carbonaceous Acid Catalysts

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The world is dependent on energy coming from fossil fuels, a source that is not only unsustainable but harmful as well. Consequently, many sustainable sources have been uncovered as candidate fuels for the future. My research has revolved around one such source: biodiesel extracted specifically from algae. Biodiesel is a crucial candidate because it can potentially meet global energy demands while combatting climate change and efficiently utilizing limited resources. The most common way to obtain biodiesel is through the transesterification of lipids with methanol. However, industries employ a method that consists of multiple steps and produces excessive waste that is discarded after completion, which renders this method inefficient. In this study, this process was refined and the proposed method allowed transesterification to be completed in one step and waste materials to be reusable. This was done through the use of novel catalysts made from sulphonated waste materials. To test the efficiency of the refined process, dried marine algae collected from Arabian Gulf beaches were put in a container with the catalyst and placed in a microwave reactor to hasten reaction. As a result, this method produced biodiesel of higher purity, 99% yield, and lower cost than does the conventional method at 70% yield. Produced fuel can be used in engines, electric equipment, stationary systems and a variety of other applications. It has been concluded that by using sulphonic acid catalysts as well as reusing waste materials, biodiesel production could be made far more efficient.

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