Synthesizing Sustainable Biodiesel Through Chemical Alteration of Plant-Based Lipids

Hoff, David (School: Colleyville Heritage High School)
Thiruvallarai, Archit (School: Colleyville Heritage High School)

Reliance on fossil fuels has caused a large increase in carbon emissions across the world, with a 43% increase of carbon in our atmosphere since 2003. Aside from this, since 2021, the costs of gasoline/diesel have increased by over 60% causing many to face economic turmoil, families unsure if they are able to pay for their next mile of gas just to get to work. After researching more into the production of diesel, we learned that biodiesel exists as a renewable alternative to solve both of these problems, but are not backed by enough research or testing to effectively replace diesel. This led us to look for an alternative way to produce biodiesel. Our research led us to a method of fuel synthesis involving the use of common household cooking oils to produce biodiesel. Through the combination of methanol, potassium hydroxide, and a cooking oil, we were able to synthesize an unpurified biodiesel, which we later separated using a separatory funnel. This funnel separated our final product from the product of glycerin made in our reaction. After testing our different biodiesel through several burn tests, we were able to determine that olive oil was the most realistic replacement of diesel as its cost to heat ratio was the closest to diesel. With our research, and testing— further experimentation can be done to eventually allow for the full adoption of the production of biodiesel using plant based lipids.

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