An Analysis on the Upscaling of Biodiesel Production from Food Waste

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Previous experimentation determined that waste grease from animal fats are a viable source for biodiesel production. The next logical step was to test large scale production feasibility and engine performance of this fuel. The performance in an engine provided evidence for an application in commercial use. For experimentation, larger grease samples were tested to investigate success on a larger scale, and methodology was refined. Following testing it was concluded that previously used methodology could not be upscaled due to the presence of water and excess NaOH (which created soap). Once changes were made, high fuel yields were achieved. After fuel was obtained and washed, engine tests were done to compare performance against a baseline of kerosene in a small jet engine. Fuel flow rates and engine exhaust gas temperatures were recorded while the engine ran at multiple RPM settings. The engine tests showed that less than a 2% increase in fuel flow rate was required to achieve the same RPM's as the kerosene. The differences in exhaust gas temperatures were also negligible, meaning no additional internal damage would result. These data demonstrate the fuel is comparable to standard kerosene and suggests that this process could produce fuel from wasted grease on a large scale that can also perform well in engines. The cost reductions associated with producing biodiesel from wasted grease, coupled with the performance data show that this process could be realistically upscaled to an industrial level.

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