Synthesizing Bio-Diesel from Different Vegetable Oils via Transesterification

Ruiz Ruiz, Jorge

The purpose of this research was to test whether bio-diesel fuels made from different vegetable oils (canola oil, corn oil, grapeseed oil and peanut oil) differed in efficiency, and to determine how these compared against standard petroleum diesel. The fuels were made from new vegetable oil, via transesterification, a process that aims to separate vegetable oil into diesel and glycerin. The bio-diesel's quality was tested to determine if it was properly synthesized and handled, and if it was ready to be used. Four quality tests were made: The “3/27 test”, which requires mixing 3mL of bio-diesel and 27mL of methanol to determine if the transesterification process was fully completed and whether all glycerin was removed; the “soap test", a process to determine how much soap and trace methoxide was left on the bio-diesel, and the clarity (visual) test, which determined the pureness of the bio-diesel. Efficiency tests were done at an energy research facility using a fuel testing diesel engine. The engine ran on each bio-diesel for 10 minutes, and data was recorded every 2 minutes. The parameters that were measured were: torque, speed, fuel temperature, generated power, fuel consumption and energetic efficiency. The bio-diesel's base oil made a drastic difference in the quality and efficiency of the fuels. The most effective bio-fuel was the corn diesel. It had consistent torque and the highest speed, as well as the lowest consumption of all bio-diesels. Most notably however, it generated the most power out of all fuels, including regular diesel.

Awards Won: