# Fatty Acid Methyl Ester Energy Solutions: Biodiesel as a DIY Energy Alternative

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Diesel fuel is one of the leading contributors to environmental pollution and can be very costly for individual consumers. Biodiesel, which is fuel made from plant and animal oil rather than petroleum, is a cleaner alternative that can be manufactured at home from used cooking grease. Unfortunately, many would-be producers are skeptical about biodiesel because they are unsure of how to produce good biodiesel. My goal is to make it easier for people to produce biodiesel at home by determining the factors that contribute to quality biodiesel and finding solutions to problems that may be encountered with materials. First produced biodiesel out of recycled vegetable, canola, peanut, and mixed oil, through the process of transesterification. I tested my product through a conversion test and spectrophotometry. The results of this trial led me to believe that the primary cause of poor quality biodiesel was the free fatty acid (FFA) content of the oil. I repeated my experiment using only used vegetable oil, this time focusing on the FFA content. In addition to my other quality tests, I conducted a titration on the finished biodiesel to determine the final FFA quantity. My hypothesis was confirmed when the lowest FFA oil produced the highest quality biodiesel. Finally, I developed a pre-treatment to reduce the content of FFAs in the oil before biodiesel production. Mixing the oil with NaOH and gelatin and then removing the gelatin after it had set was very effective in meeting this goal.