

Clean Diesel Technologies for Air Pollutant Reduction (Biodiesel Project)

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Objectives

- Goals
- Experimental methods
- Results
- Conclusions

Goals

- Convert WFO to biodiesel regardless of % FFA
- Determine cost for UC to implement biodiesel production

Chemistry of Biodiesel

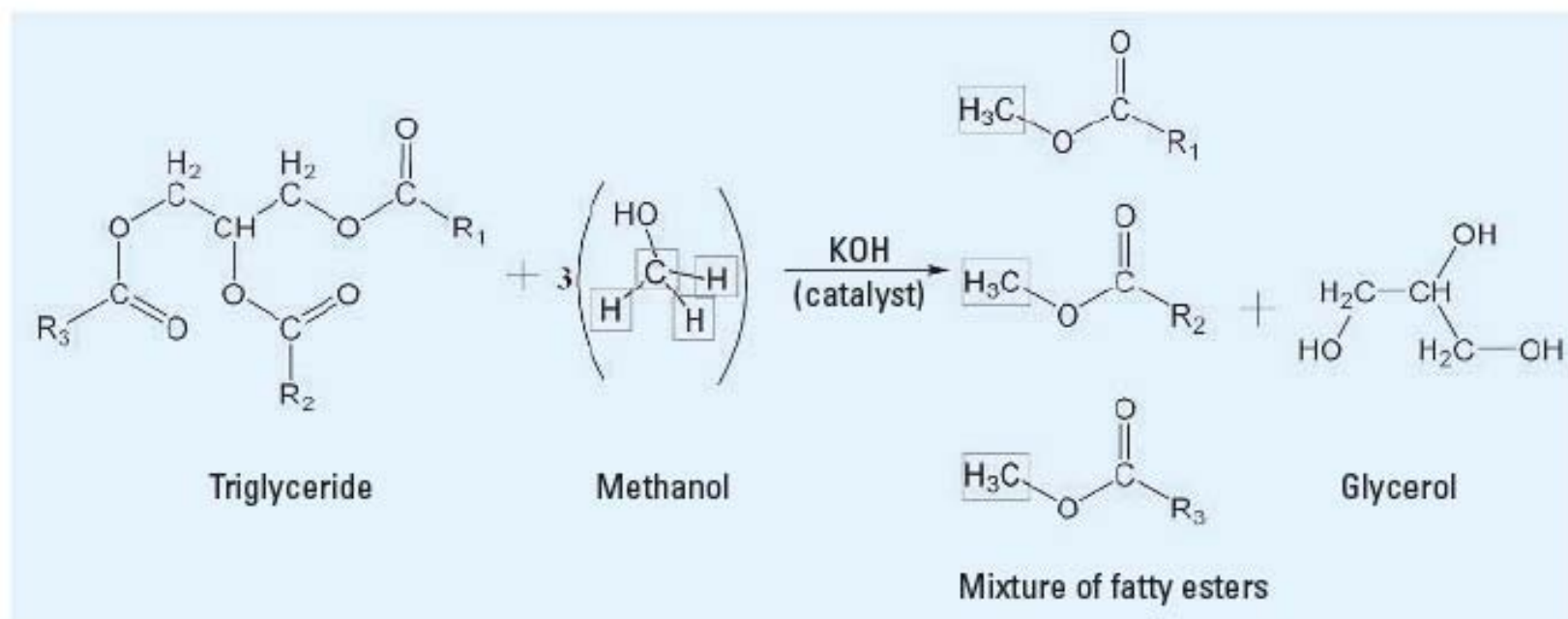
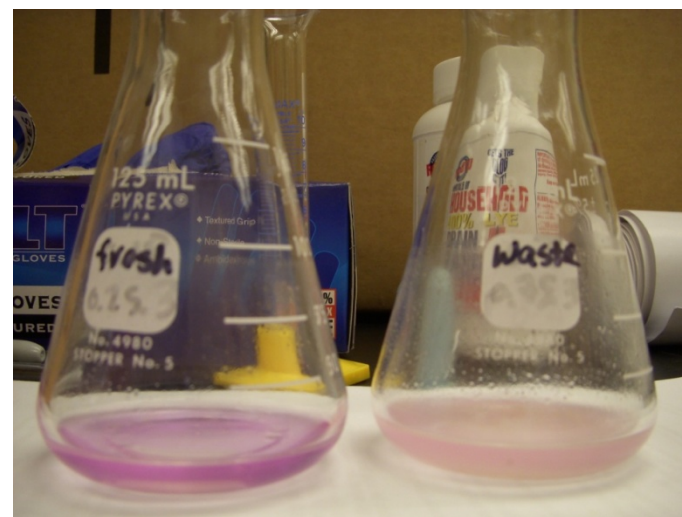
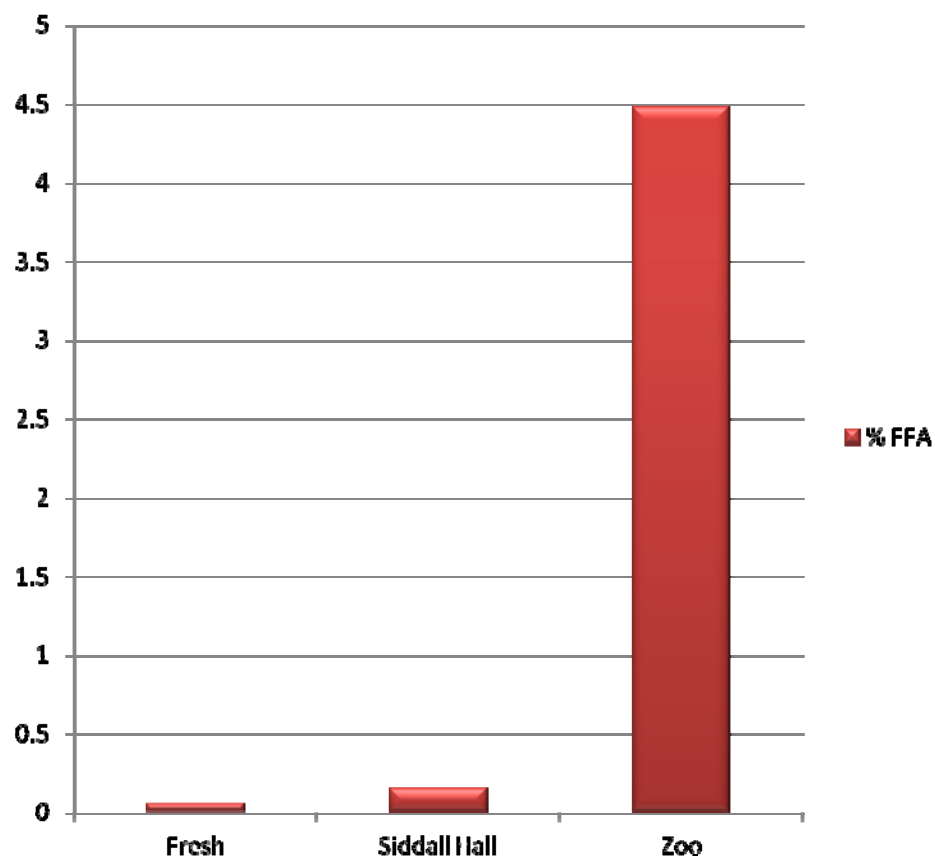


Figure 1. Transesterification reaction for producing biodiesel from triglycerides where R₁, R₂, and R₃ are long chains of saturated/unsaturated hydrocarbons (i.e., fatty-acid chains). Typically potassium hydroxide (KOH) is used as the catalyst.

<http://www.ehponline.org/members/2006/9631/fig1.jpg>

Titration

Titration Results % FFA



Alkaline Catalyst

- NaOH catalyst
- Time: 1 hour



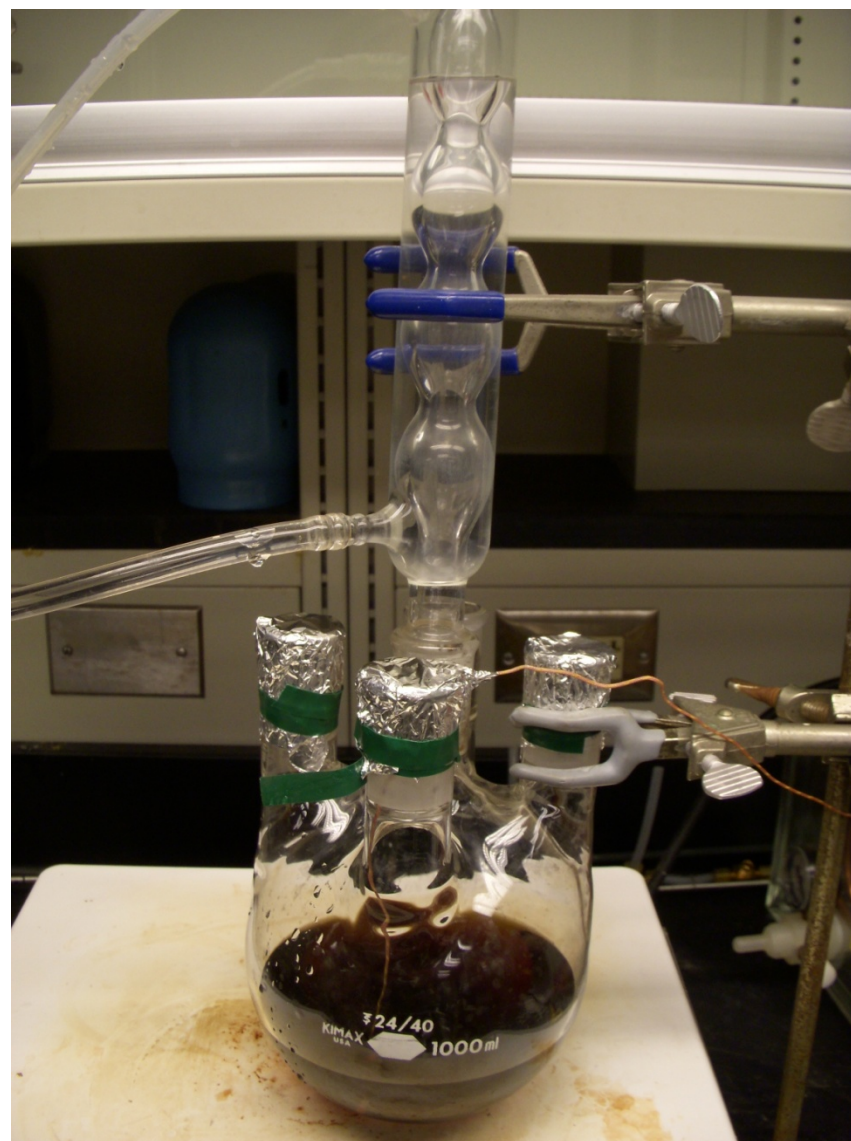
Acid Pre-treatment



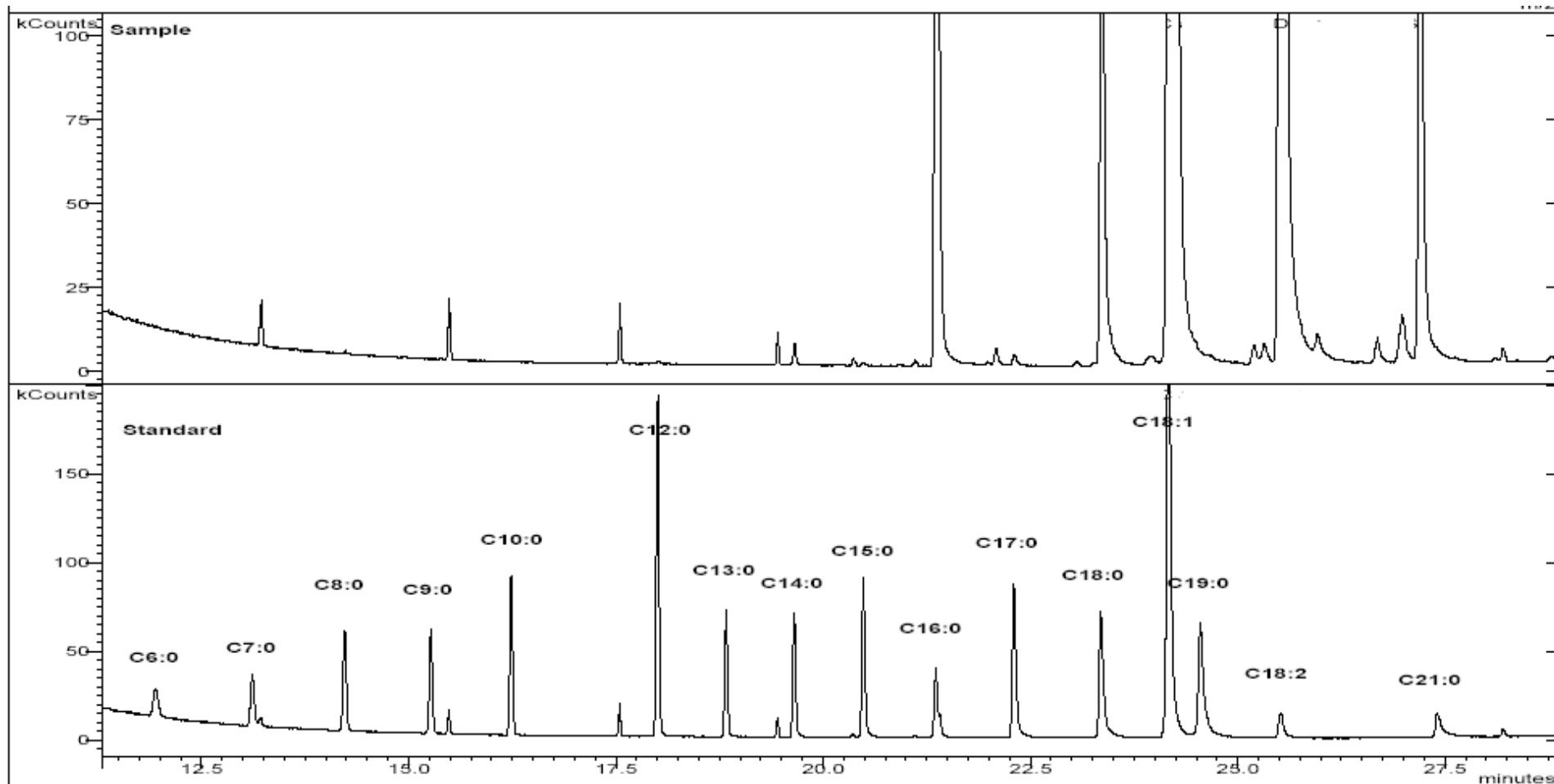
- H_2SO_4 pre-treatment
- NaOH catalyst
- Time: 1 hour

Acid Catalyst

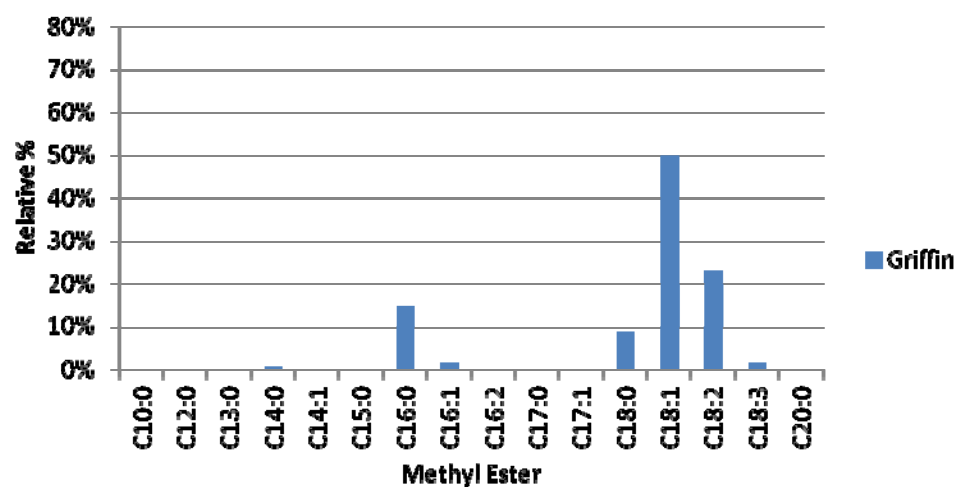
- H_2SO_4 catalyst
- Time: 50 hours



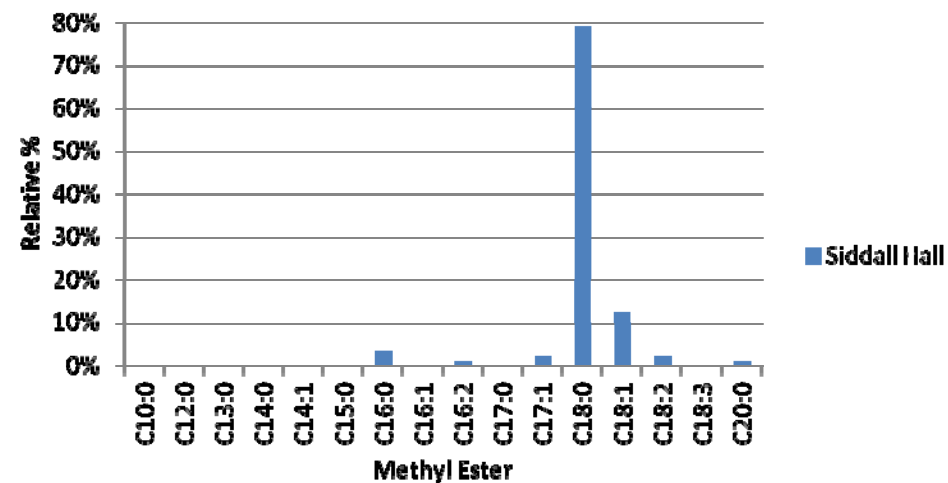
Gas Chromatography-Mass Spectrometry (GC-MS)



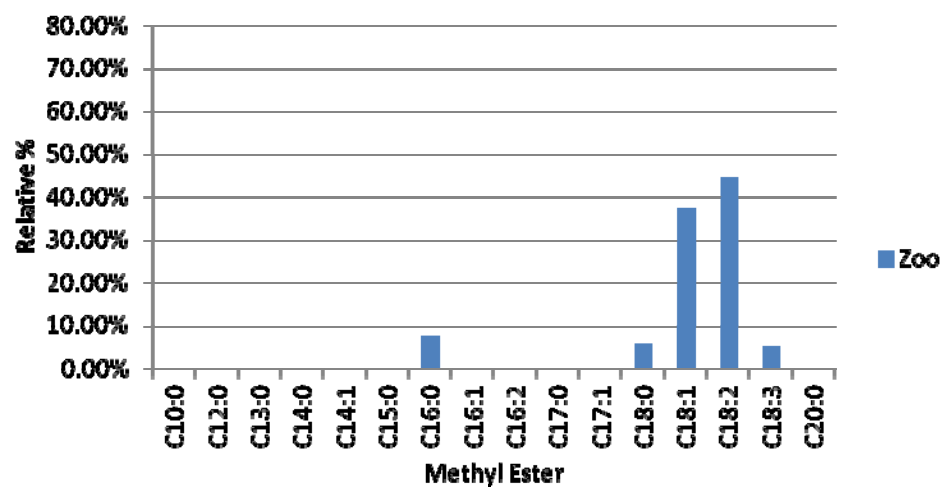
Griffin Fuel Analysis



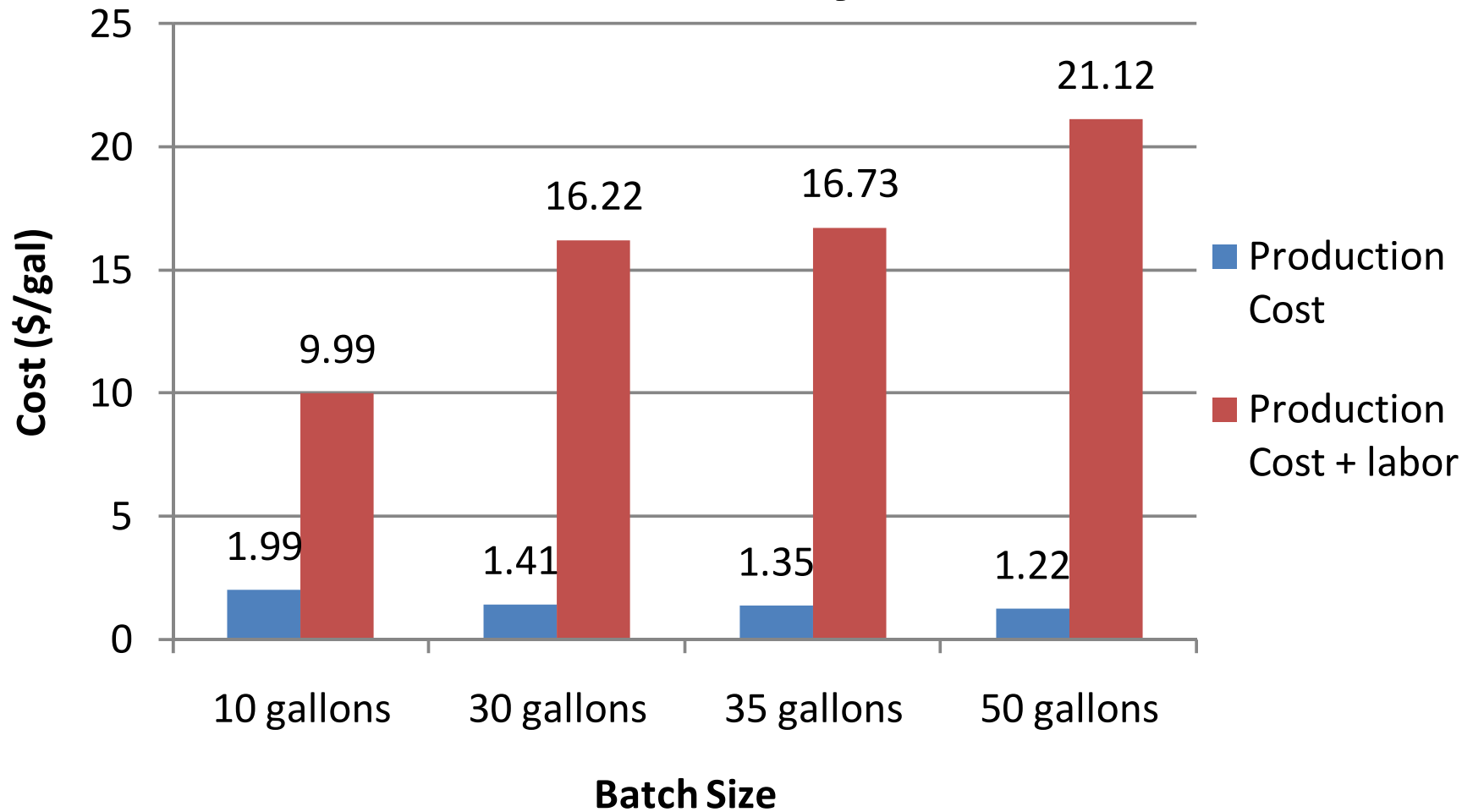
Siddall Hall Fuel Analysis



Zoo Fuel Analysis



Cost Analysis



Conclusions

- Biodiesel can be successfully transesterified from WFO regardless of the % FFA
- Quality of biodiesel is consistent with an industry standard
- Labor intensive process causes production to be cost prohibitive