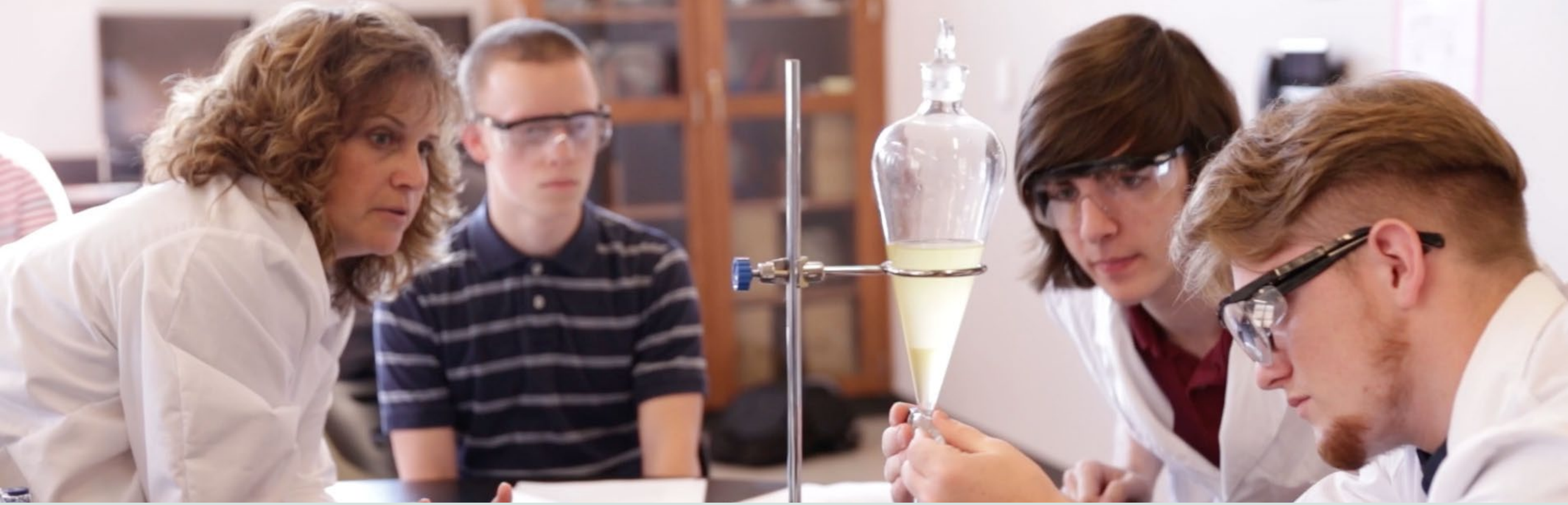

Making biodiesel

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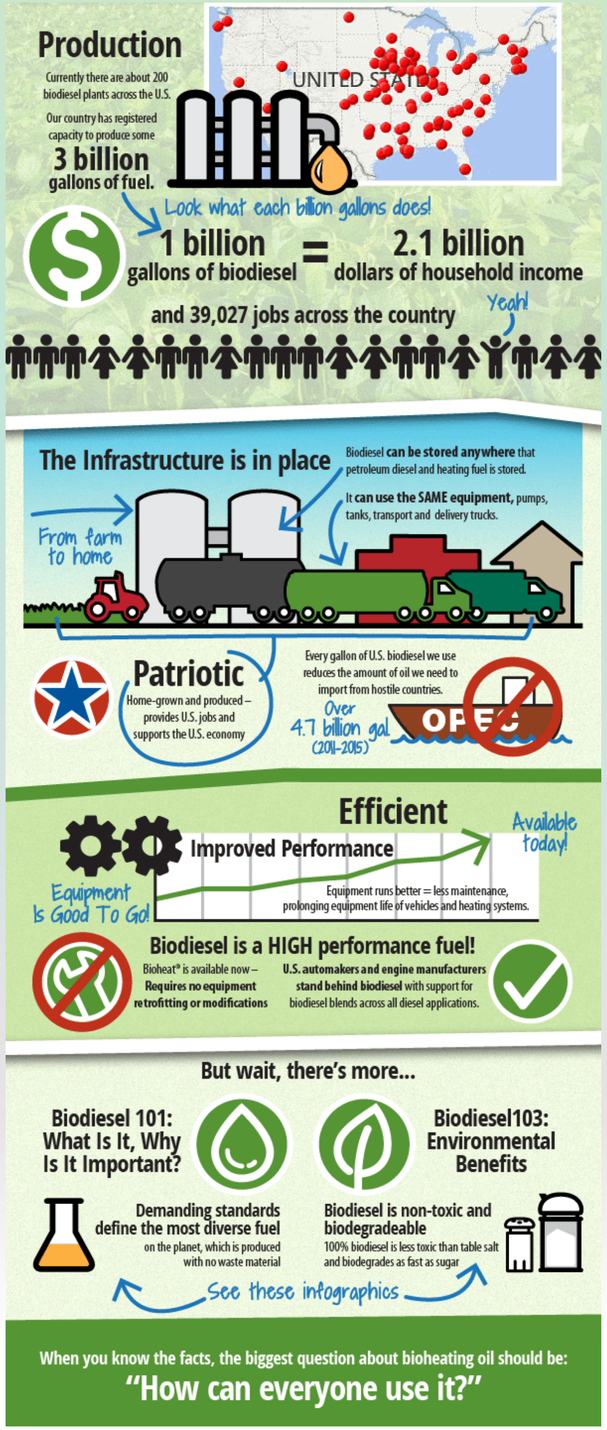


US Department of Energy strategic plan

Vision 2040: A thriving and sustainable bioeconomy fueled by innovative technologies

Key opportunity:

- Biofuels and bioproducts offer a unique complement to other alternative energy technologies
- Bioenergy enhances energy security and provides U.S. economic benefits
- Bioenergy provides value for otherwise problematic waste streams
- Bioenergy can enhance the environment with purpose-grown feedstocks.

Day 1: Making the biodiesel

1. Under a fume hood measure out 60mL of methanol and add to glass jar, then seal jar quickly.
2. Weigh out 1.5g of KOH (Potassium Hydroxide) and quickly add it to the jar of methanol. Seal jar immediately and shake to dissolve. Make sure to not leave the cap of of the KOH for too long because it is hydroscopic.
3. At the lab station, in a clean beaker, warm 150mL of oil sample to 50 °C. Once oil is at 50 °C, add it to the jar of methanol/KOH solution.

4. Add magnetic stir bar to the jar, loosely place lid back on jar and place jar back on magnetic/ stirring hot plate to heat to 50 °C and stir on high for 15 min.
5. Remove the jar from heat and pour mixture into a labeled separatory funnel for 24 hours to allow for separation of the raw biodiesel and glycerin.
6. Repeat steps 1–5 with other oil sample. Make sure samples are properly labeled.

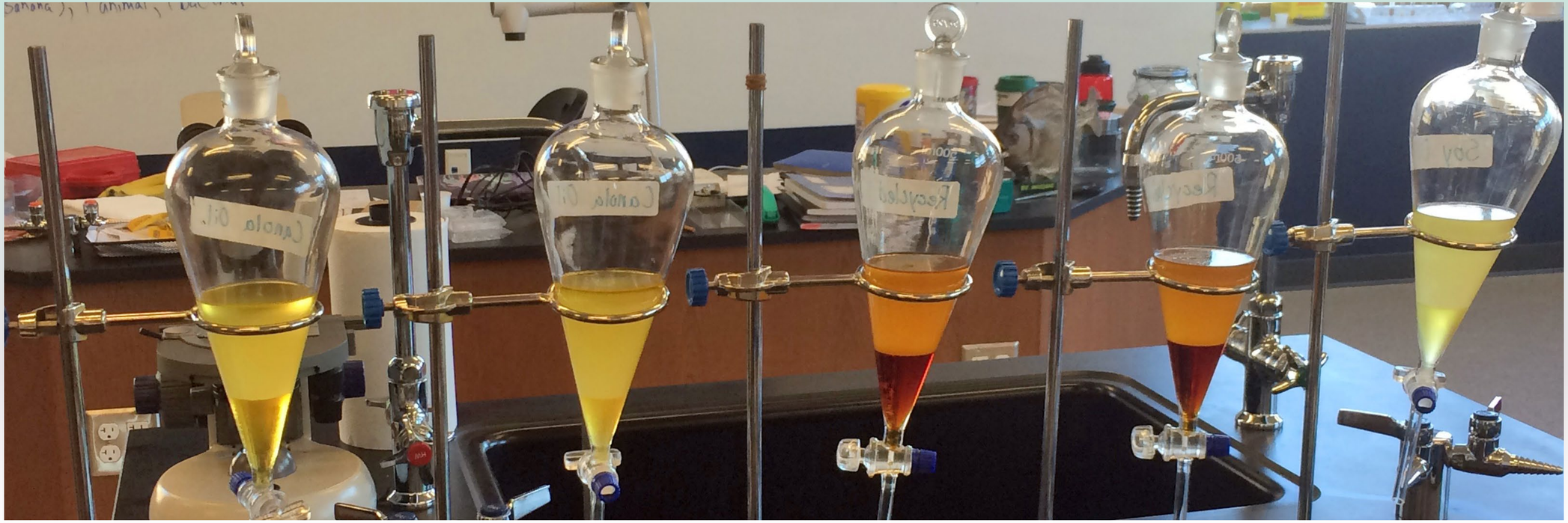
Visual observations from day 1

(make sure to describe waste vs virgin samples)

1. Immediately upon adding the methoxide, what was noticed about the vegetable oil? Was there any change in color in each sample?
2. What did the solution look like after it began stirring?
3. Once the mixture has rested for 24 hours in a separatory funnel, describe what visual observations noticed for each sample.

Day 2: Initial removal of glycerin

1. Drain the glycerin from the biodiesel into your jar. Using a graduated cylinder, record the amount of glycerin retrieved from the samples.
   (Note: Crude biodiesel contains impurities such as soap, incompletely transesterified glycerides, and methanol and must be cleaned/washed prior to use.)



Washing process

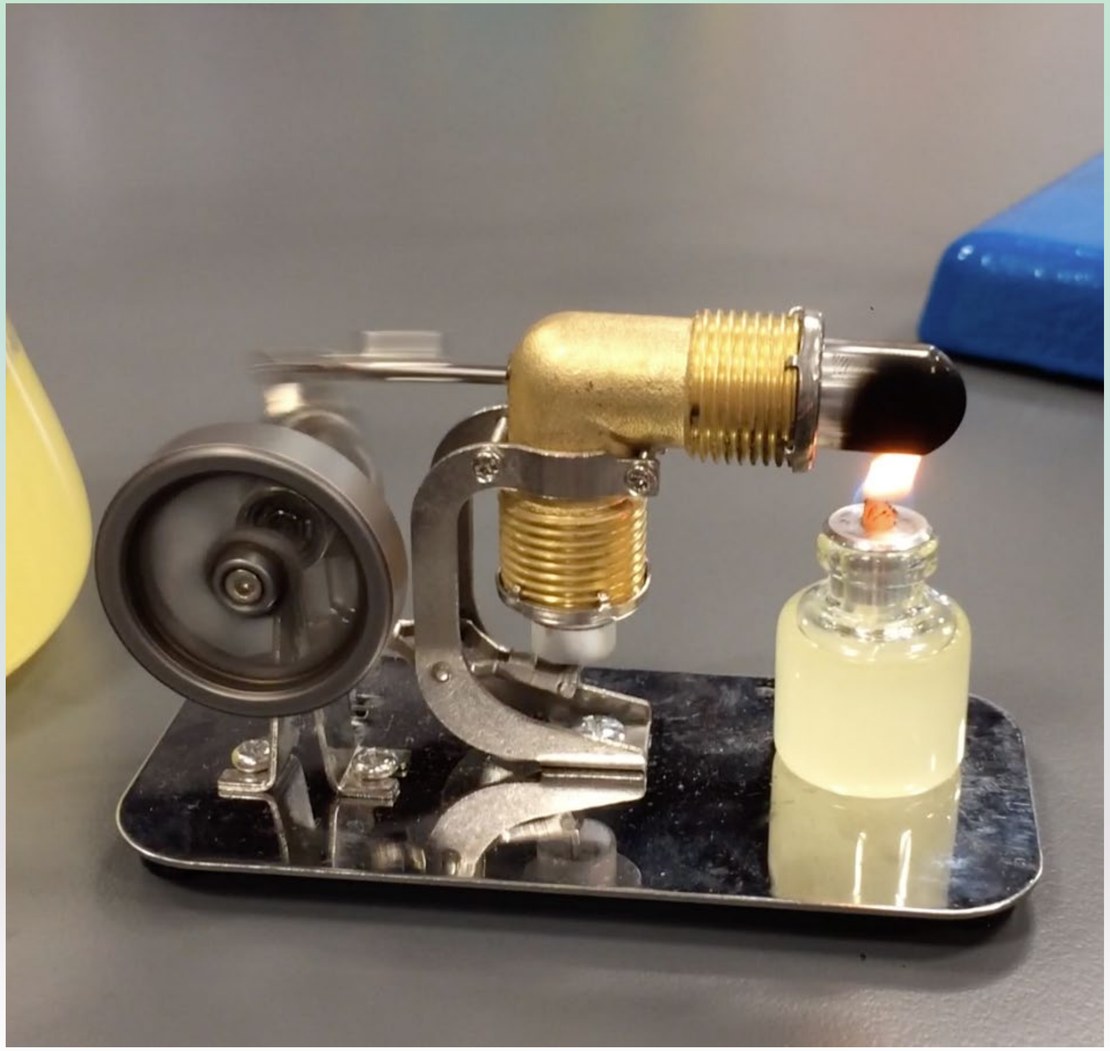
Wash and dry biodiesel

1. Using a serological pipette, slowly add a total of 20 mL distilled water down the side of the separatory funnel to the raw biodiesel.
2. Remove separatory funnel from the ring stand and gently rock the separatory funnel back and forth for five minutes to wash the biodiesel. (Do NOT shake).
3. Place funnel back into ring stand and wait 10 minutes for the mixture to separate into two layers. Discharge the bottom “soapy” layer. Remove soap/glycerin waste into a waste flask.
4. Repeat washing procedure steps 1–3 for a second washing.
5. Repeat washing procedure steps 1–3 twice for a second sample.

Data from washing biodiesel

1. Now that biodiesel has rested for 24 hours in a separatory funnel, describe what you see for each sample.
2. Record the following characteristics of your biodiesel sample: *color, consistency, odor.*
3. Using pH paper or probe, test the pH of the “soapy” layer collected from both washings and record in data table.
4. Measure the quantity of biodiesel in a graduated cylinder and record the amount of in a data table.
5. Calculate the % yield of your biodiesel production using the following equation:
   % yield = volume biodiesel / (volume biodiesel + volume glycerin) × 100%

Now we have biodiesel!



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