

Biofuels: Hot Topics

Lending Kit Instructions and Contents



Lending Kit Information:

Kits containing equipment necessary to perform the activities from the Biofuels: Hot Topics workshop will be available for borrowing for teachers who completed the Biofuels: Hot Topics workshop. The kits will be stored in the Science Outreach Prep Room at Washington University in St. Louis. The prep room is directly across from the room where we had the workshop (Busch Lab 151).

Kits will be reserved for an entire week beginning Monday morning and ending Friday evening. If you would like to pickup a kit the weekend before your reservation, check the schedule and contact the person who has the kit before you and arrange for a person-person exchange. If nobody has reserved the kit the week before you would like it, you are welcome to get the kit the Friday or Saturday before your reservation. Please let us know your plans so we can coordinate this.

There is considerable flexibility with pick-up and drop-off times. Usually, somebody is present at Science Outreach M-F 8 am – 5 pm and can open the doors for you if they are locked (if nobody is around on the lower level, try the main offices one level above where we met for the workshop).

Saturday drop-offs and pick-ups are possible if you give me notice. We can leave the kit on the tables outside of the workshop room (Busch Lab 151). The building doors are open 7 am to 7 pm M-F except on holiday weekends. On holiday weekends, all campus doors are likely to be locked on Saturday. For non-holiday Saturday pickups, the west door on the map indicated below may be locked. If so, enter the building through the east door near the garden or the north entrance (Rebstock Hall Complex). You can still park as indicated below as you can always exit through a locked door (getting in is the tricky part).

Where to park:

The easiest place to park is in the alley on the west side of the Life Sciences Building and the Busch Lab (see map at the end of this document). The area is marked No Parking, but it is okay for quick pick-ups and drop-offs. Enter through the wooden door with the round top mid-way down the alley (you will see it on your right). Alternatively, you can park in a Red Space near the garden on the east side of the greenhouse (see map at the end of this document).

Kit sizes:

Please make sure you have adequate space in you vehicle when picking up a kit. Kits are stored in 1-2 large plastic containers (approximately 3 feet long, 1.5 feet wide, and 1.5 feet high). The fuel cell car kit comes as 2 large containers and 11 small containers.

Schedule:

To reserve a kit, please visit the following web site to check availability:

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<http://www.umsl.edu/~biofuels/Weeklycheckoutlist07-08.htm>

To reserve a kit for a week, send an email to Phil Weyman, weymanp@umsl.edu, indicating the kit you want and the week you would like it and your reservation will be updated on the website schedule.

Please remember that signing up on the schedule does not tell us WHEN you will be coming. You will need to communicate to us by email when you plan to pick up and drop off the kits so we can have them ready. This should all go smoothly if we communicate well.

Protocols:

Protocols for all experiments can be found by following the links from this website:

<http://www.umsl.edu/~biofuels/exercises.html>

Cleaning and damage:

Please return the kits as clean and orderly as possible. The next person to receive the kit will thank you. If something should break, please email me (weymanp@umsl.edu) as soon as possible. You will NOT be responsible for replacing the item (accidents happen), but we would like to be able to fix the problem quickly.

Kit Contents:

Greenhouse Effect Kit

- 8 shop lights
- Heat bulbs
- Wood splints
- Red cups for measuring baking soda and vinegar
- 8 low-form plastic dishes for mixing baking soda and vinegar

Greenhouse Effect Kit (additional required equipment and reagents NOT provided in the kit)

- Aquariums, high-walled plastic bins, 2 L soda bottles (note: we haven't tried this) or other suitable container in which to perform the experiment
- Aquarium rocks, soil, or other thermal mass to help radiate heat

Energy Meter Kit

- 6 Kill-a-watt energy meters
- Toaster
- Hairdryer
- Lamp
- Light bulbs of different wattage in a box
- 6 extension cords

Hydrogen Fuel Cell Car Kit

- 10 shop lights with 100 watt bulbs

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- Wood splints
- Test tubes – 13x100 mm
- Assorted batteries
- Assorted alligator clip cords with paper clip leads (useful for recharging the fuel cell car faster than with the solar panel)
- 3 lighters
- 10 plastic rectangular dishes (use only for distilled water)
- 10 car kits (kits 1-10, blue lids)
- 1 car spare parts kit (good for front of the class demos) Kit#11, white lid
- Car kit parts:
 - Fuel cell car with 4 wheels
 - Gas tanks
 - 2 long hoses with clear plastic nozzles
 - 2 short hoses with red plastic nozzles
 - Fuel cell
 - Syringe with short plastic tubing
 - Multi-meter

Fuel Cell Car Kits (additional required equipment and reagents NOT provided in the kit)

- 10 Ring stands with ring attachment and clamp attachment
- 10 Bunsen burners and igniters

Biodiesel Testing Kit

- Steel wool
- Sink aspirator attachments
- Biodiesel testing apparatus (6 setups) each contains:
 - Glass funnel
 - Glass elbows (2/setup, 1 longer and 1 shorter)
 - Vacuum tubing
 - Heavy-walled tube, 15 cm long
 - 2 stoppers with holes
 - 250 ml side-arm flask
 - Porcelain evaporating dishes
 - Glass plates for extinguishing flames
- Extra glass elbows

Biodiesel Testing Kit (additional required equipment and reagents NOT provided in the kit)

- Petro-diesel or white gas camping fuel for biodiesel comparison
- Ring stands with clamp attachment
- Lighters to ignite the biodiesel

Making biodiesel (included in Biodiesel Testing Kit)

- Sodium sulfate (anhydrous), powder

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- Big and little screw top vials (note the bigger caps go on the bigger tubes, smaller caps on the smaller tubes)
- Plastic droppers

Making biodiesel (additional required equipment and reagents NOT provided in the kit)

- Methanol
- 6 M potassium hydroxide
- Universal indicator
- Saturated NaCl (about 30% w/v)
- Test tube racks

Microbial Fuel Cell Kit

- Potassium ferricyanide (can be poisonous if exposed to acidic solution)
- Potassium phosphate monobasic
- Potassium phosphate dibasic
- Extra MFC parts/materials, extra tubing
- MFC instruction manual (from manufacturer)

Setup #1

- Multi-meter with alligator clips
- 60 ml syringe (3)
- Plastic connectors (3)
- Ion exchange membranes (2)
- Chamber without end plate (1)
- MFC electrodes (2 blank graphite, 1 Pt coated)
- LED light (1)
- Nuts (4)
- Connecting cable (1)
- Plastic tubing (3 pieces)
- Rubber gaskets (4)
- End plate with attached chamber (2)
- 20 uM methylene blue solution
- Washers (8)
- Screws (4)
- Aquarium pump
 - Plastic connector (1)
 - Plastic tubing (1 piece)
 - 20 gauge needle (1)

Setup #2

- Multi-meter with alligator clips
- 60 ml syringe (3)

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- Plastic connectors (3)
- Ion exchange membranes (2)
- Chamber without end plate (1)
- MFC electrodes (1 blank graphite, 2 Pt/polymer coated)
- LED light (1)
- Wing nuts (8)
- Connecting cable (1)
- Plastic tubing (3 pieces)
- Rubber gaskets (4)
- End plate with attached chamber (2)

Microbial Fuel Cell Kit (additional required equipment and reagents NOT provided in the kit)

- Soil bacterial culture (see instructions on how to prepare)

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Washington University Science Outreach

- Washington University Danforth Campus is located on the north side of Forsyth Boulevard, between Big Bend Boulevard to the west, and Skinker Boulevard to the east.
- From Forsyth Boulevard, enter Tolman Way. Park on the east or south sides of the greenhouse.
- Enter the buildings (Starred) on either the west or the east side of the Life Sciences Building. Science Outreach occupies the first and second floors of Busch Lab.

