

### Components

NAME	DESCRIPTION	AUDIENCE
	<i>Biodiesel</i> teacher guide	This shows how the resource can be used to improve students' understanding of the preparation and benefits of biodiesel as an alternative to petroleum.
	<i>Making biodiesel</i> procedure sheet	This provides students and teachers with a procedure for the preparation of biodiesel from vegetable oil.
	<i>Comparing fuels</i> procedure sheet	This procedure sheet explores some properties of biodiesel and other hydrocarbons commonly used as fuels.

### Purpose

To develop students' understanding of the role of biodiesel as a possible fuel alternative

To enable students to make informed judgments about the sustainability issues associated with moving towards using biodiesel as a large scale alternative to petroleum fuels.

### Outcomes

Students:

- explain how biodiesel can be prepared in a laboratory;
- describe properties of biodiesel and other common hydrocarbon fuels;
- describe economic and environmental benefits of using biodiesel as an alternative to petroleum fuels;
- describe economic, environmental and social costs of large-scale biodiesel production; and
- explain how science may be used to develop solutions to diminishing energy resources.

### Activity summary

ACTIVITY	POSSIBLE STRATEGY
Distribute and use the fact sheet, <i>Biodiesel dilemma</i> , from <i>Hydrocarbon chemistry 1: Coconut oil</i> to give students an understanding of the potential of biodiesel as an alternative to petroleum diesel. (See <b>Notes for teachers</b> below)	KWL or PMI chart
Distribute the procedure sheet <i>Making biodiesel</i> . Biodiesel product from the experiment should be saved for comparison with other fuels.	group
Students perform experiments on the procedure sheet, <i>Comparing fuels</i> , then answer questions on the sheet.	group, individual

### Technical requirements

The guide and procedure sheets require Adobe Reader (version 5 or later), which is a free download from [www.adobe.com](http://www.adobe.com). The procedure sheets are also provided in Microsoft Word format.

## Notes for teachers

The fact sheet, *Biodiesel dilemma*, included in *Hydrocarbon chemistry 1: Coconut oil* provides students with introductory information about biodiesel and its production. It may be useful to use a **KWL** strategy to help probe students' thinking about the topic. In groups, students could complete the first two columns:

- what I Know about biodiesel.
- what I Want to know about biodiesel.

As students continue to learn more about biodiesel production through later activities, they can add to their questions and write their own answers in the third column:

- what I have Learned.

Another strategy could be to use a **PMI** (Plus, Minus, Interesting) to help them assess the sustainability issues in relation to the production and use of biodiesel.

A background sheet with information for teachers on biodiesel (*What is biodiesel?*) is included in the SPICE resource *Hydrocarbon chemistry 1: Coconut oil*.

### Making biodiesel

The procedure sheet, *Making biodiesel*, provides students with a method for making biodiesel in a laboratory. Safety precautions must be employed as chemicals used are harmful in contact with skin and eyes. See procedure sheet for details.

Students should retain a small sample of biodiesel for comparison with other hydrocarbon fuels in the procedure, *Comparing fuels*.

### Comparing fuels

The procedure sheet, *Comparing fuels*, provides students with an opportunity to compare properties of common hydrocarbons used as fuels with their sample of biodiesel from the previous activity, *Making biodiesel*. Hydrocarbons are flammable. Safety precautions such as wearing safety glasses are detailed in the procedure sheet.

## Acknowledgements

Original concept design: Don Marshall and Sally Harban (John Curtin College of the Arts).

Designed and developed by the Centre for Learning Technology, The University of Western Australia, Production team: Alwyn Evans, Bob Fitzpatrick, Jenny Gull, Dan Hutton and Michael Wheatley.

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## Associated SPICE resources

*Hydrocarbon chemistry 2: Biodiesel* may be used in conjunction with related SPICE resources to address the broader topic of organic chemistry.

DESCRIPTION	LEARNING PURPOSE
<i>Hydrocarbon chemistry</i>  This learning pathway shows how a number of SPICE resources can be combined to teach the topic of organic chemistry.	
<i>Hydrocarbon chemistry 1: Coconut oil</i>  This resource engages students in organic chemistry by showing them how fuel can be made from plants in a very basic home set-up.	<b>Engage</b>
<i>Hydrocarbon chemistry 2: Biodiesel</i>  This resource further explores biodiesel production as students make their own biodiesel and compare its properties with those of other fuels.	<b>Explore</b>
<i>Hydrocarbon chemistry 3: Naming hydrocarbons</i>  This resource explains to students how hydrocarbons can be drawn and systematically named.	<b>Explain</b>
<i>Hydrocarbon chemistry 4: Hydrocarbon economy</i>  Australia uses a wide range of hydrocarbons for domestic and industrial purposes. How is this range supplied from available sources?	<b>Elaborate</b>