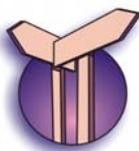




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Popularity and Relevance of Science Education for scientific Literacy



## Should Vegetable Oils be used as a Fuel ?



### Student Activities

Read the following scenario and then undertake the activities suggested below:

#### Scenario

Old Fred lives in the city of Los Angeles in the USA. He suffers from bronchitis and finds it difficult to breathe. His doctors advise him to move away from Los Angeles to somewhere where the air is more fresh and contains much less hydrocarbon and sulphur emissions. Alas old Fred cannot afford to move, but instead plans to interest diesel vehicle manufacturers in a cleaner fuel. Fuels based on vegetable oils produce much less hydrocarbon emissions and practically no sulphur emissions. Although, direct use of the oil itself is possible only with modification to existing diesel engines, old Fred suggests vegetable oils can be changed to biodiesel and biodiesel requires little modification to existing vehicle engines. Unfortunately biodiesel, made from vegetable oil, is based on foodstuffs such as corn. It can take away food from hungry mouths!!



### Your Tasks

You are asked to embark on a project to develop and test an alternative fuel to diesel made from crude petroleum. In particular you are asked to consider a fuel from vegetable oils, especially its preparation and suitability.

In addition, you are asked to discuss the use of vegetable oils as alternative fuels for vehicles?

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**Developer: Jack Holbrook (based on Supplementary Teaching Materials (eds) Jack Holbrook and Miia Rannikmae, ICASE, 1997)**

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## Student Activities

1. Noting vegetable oils are esters and you are familiar with them when learning about the saponification process to make soap, discuss ways to modify vegetable oils to make a diesel fuel suitable for existing diesel engines.
2. In a group, following instructions given by the teacher and appreciating the catalyst needs to be in a non-aqueous environment, make biodiesel using the vegetable oil supplied.
3. Separate out the biodiesel from the more viscous reactant using a separating funnel. (Take care because if the two liquids are shaking together they will form an emulsion which will take a long time to separate).
4. Test the biodiesel using simple tests. You are expected to suggest these tests and the equipment needed and to undertake the tests. In a group complete the tests, once the teacher has approved your procedure.
5. Write an individual report on the making of biodiesel, its separation and the testing of the product for suitability as a fuel.
6. Discuss whether it is acceptable to use biodiesel in vehicles.

## Factors to consider :

- a) *Are these viable alternatives (perhaps by being converted to a better product?) ?*  
They are viable if vegetable oils are easily obtained, are cheap and are usable in a diesel engine directly, or with simple or cheap modifications - modifications to the diesel engine itself, or the conversion of vegetable oils to products usable in diesel engines.  
If so, which vegetable oil is 'best' ?
- b) *Are bio-diesels economically and commercially suitable for use as fuels ?*  
They are suitable if they are of sufficient calorific value and have properties that make them stable and safe for storage, and for the public and the environment when used.
- c) *Would it be ethical ?*  
Vegetable oils are a source of food for both humans and animals. To use vegetable oils for fuel, land needs to be set aside for this purpose. This land is thus not available for growing foodstuffs. If land is plentiful, setting aside some land is not a problem, but when the land needed to generate fuel is at a premium, it becomes a question of ethics.

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